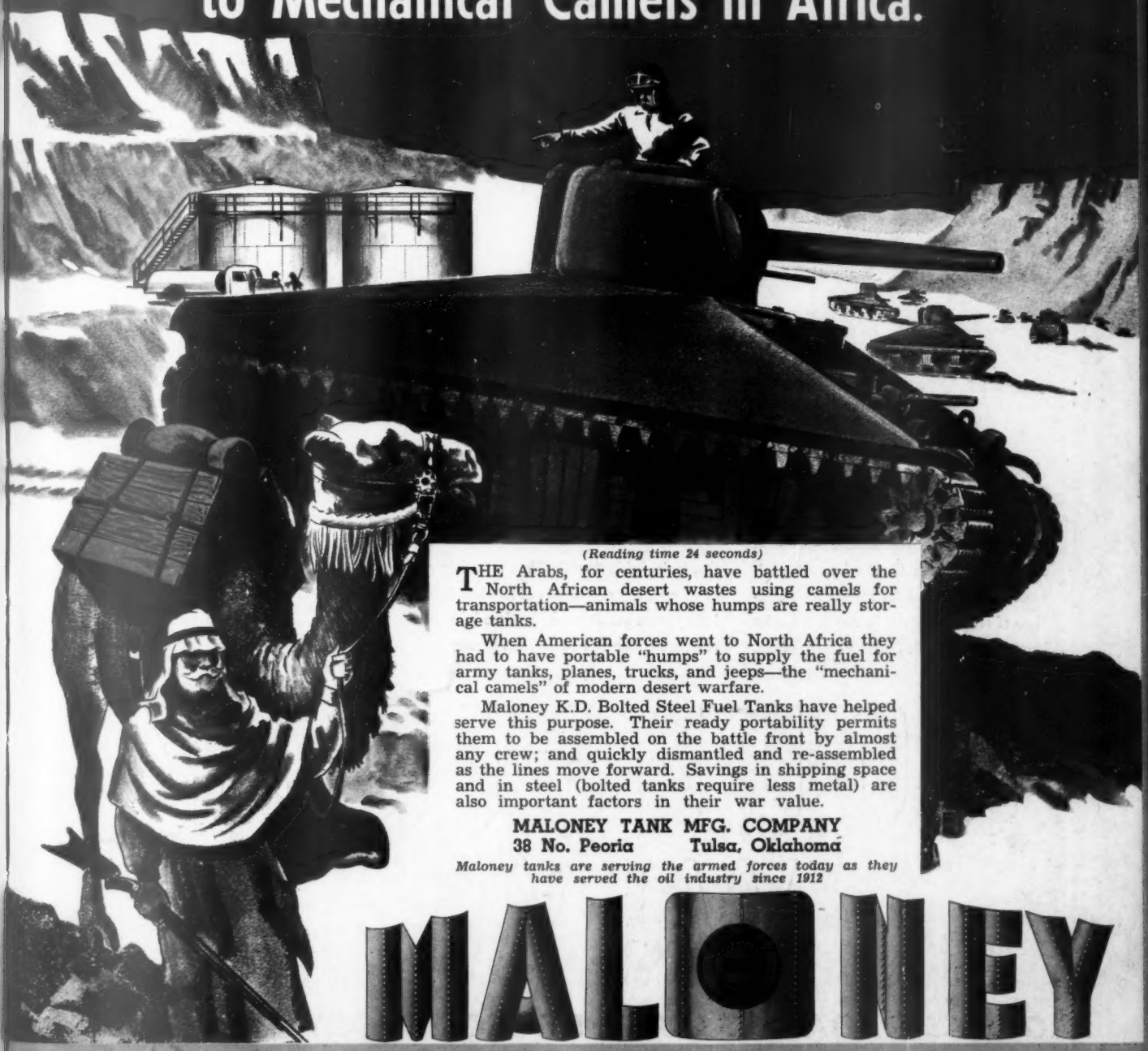
MAY 24 1943

# The OIL AND GAS JOURNAL



## How Maloney Tanks Serve as "HUMPS" to Mechanical Camels in Africa.



*(Reading time 24 seconds)*

THE Arabs, for centuries, have battled over the North African desert wastes using camels for transportation—animals whose humps are really storage tanks.

When American forces went to North Africa they had to have portable "humps" to supply the fuel for army tanks, planes, trucks, and jeeps—the "mechanical camels" of modern desert warfare.

Maloney K.D. Bolted Steel Fuel Tanks have helped serve this purpose. Their ready portability permits them to be assembled on the battle front by almost any crew; and quickly dismantled and re-assembled as the lines move forward. Savings in shipping space and in steel (bolted tanks require less metal) are also important factors in their war value.

**MALONEY TANK MFG. COMPANY**
**38 No. Peoria Tulsa, Oklahoma**

*Maloney tanks are serving the armed forces today as they have served the oil industry since 1912*

MALONEY


MAY 20, 1943

# WAR HAS NO SUNDAYS ...nor do Valves

*"Around the Clock"* duty is the service Nordstrom Valves have always given. Operators expect more service from Nordstroms because these valves are engineered fbr operations far beyond the limitations of ordinary valves. In war-time service Nordstroms eliminate frequent replacements, thus saving critical metals. Their ease of operation, certainty of control and freedom from leakage save man-hours and reduce hazards. Now, more than ever before, Nordstroms are the most essential valves in the petroleum industry for drilling, production and refining.

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*A Subsidiary of*
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**PROTECTED AGAINST LEAKS BY "SEALDPORT" LUBRICATION**

# the OIL AND GAS JOURNAL

*published weekly by the*

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General
Heading: BAKER ROTARY WALL SCRAPER

**BAKER OIL TOOLS, INC.**
*Main Office and Factory*
6000 So. Boyle Ave., Box 127, Vernon Station, Los Angeles, Calif.
*Central Division Office and Factory:*
6023 Navigation Blvd., Box 3048, Houston, Texas
*Export Sales Office:*
19 Rector Street, New York, N. Y.

Unit No. A-30

Subject:
Enlarging Hole to Provide Clearance for Liners

Index: 250.1
Date: May 20, 1943
Page: 1

Many operators when setting liners, prefer to run the largest possible liner down through the water string and in such a practice the matter of clearance becomes an important factor. To insure getting the liner to bottom safely without sticking, it has become standard practice in many fields to enlarge the hole from casing shoe to bottom with a Baker Wall Scraper.

Details of such an application are given below.

Hole Scraped from Casing Shoe to Bottom to Provide Clearance for Liner or Casing
Original Hole
Additional Enlargement to Provide for Cement Anchor Around Shoe of Casing or Liner

In the particular well illustrated at left, 8⅝" O.D. casing was set with 7⅞" drilled hole below the shoe. It was desired to run a 6⅝" O.D. threaded and coupled liner. The O.D. of the coupling on the liner being 7⅜" was a little too close for comfort to run in a 7⅞" hole. Accordingly, the hole was enlarged from casing shoe to bottom (1000 ft.) with a Baker Wall Scraper. The liner was run to bottom safely without danger of sticking.

For details concerning construction and operation of the Baker Wall Scraper, see pages 279-287 of the 1942 Baker, or Composite, Catalog. Also send for Baker Broadcast No. 19, a 40-page illustrated treatise covering Baker Wall Scraper applications.

Product No. 500
Baker Rotary Wall Scraper

## IMPORTANT APPLICATIONS

Enlarging Hole to Provide Clearance for Liners
Scraping Face of Producing Zone
Setting Cement Plugs
Water Shut-Off Tests
Straightening Holes
Enlarging Holes for Gravel Packing
Side Wall Sampling
(By converting Scraper into Baker Wall Sampler)

*Service Note*
Competent Baker men will service, make suggestions, and otherwise assist in securing best possible results.

the OIL AND GAS JOURNAL

# Trends

**Crude-Oil Production By States—Page 107**

**CRUDE PRODUCTION** 4,013,985 bbl. daily average—up 112,715 bbl. One year ago 3,496,055 bbl.

**CRUDE STOCKS** 240,775,000 bbl. as of May 8—down 2,141,000 bbl. One year ago 255,185,000 bbl.

**GASOLINE STOCKS** 88,166,000 bbl. as of May 8—down 1,863,000 bbl. One year ago 100,780,000 bbl.

**RESIDUAL FUEL-OIL STOCKS** 67,577,000 bbl. as of May 8—up 586,000. One year ago 79,593,000 bbl.

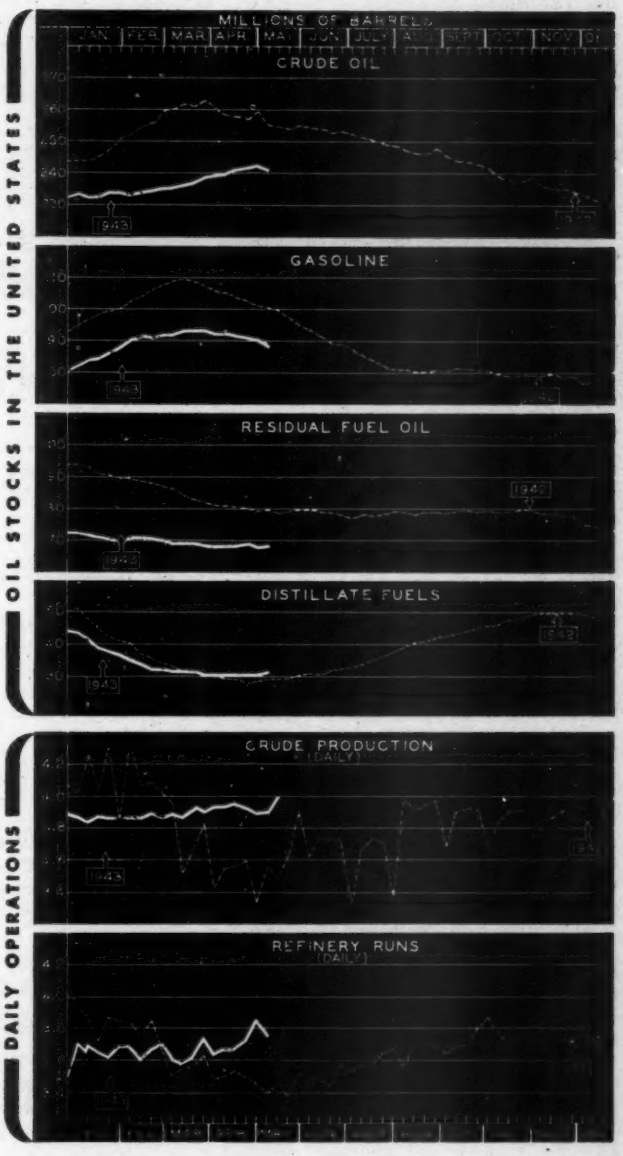
**GAS OIL AND DISTILLATES** 31,663,000 bbl. as of May 8—up 872,000. One year ago 29,110,000 bbl.

**REFINERY RUNS** 3,755,000 bbl. daily week ended May 8—down 94,000. One year ago 3,400,000 bbl.

THE public flexing of muscles by synthetic-rubber and aviation-gasoline officials apparently has ended. The belligerents have gone inside for the main show. On the surface, conflicts between Jeffers, Ickes and representatives of the military services have been amicably settled. But reports from Washington belie the outward appearance of tranquility. So far as the rank and file of the oil industry are concerned, the private settlement of official jealousies is just as well. There remains, however, a major void in the intelligence of the industry. It is difficult for the industry to understand why the production of aviation gasoline, that is the over-all figure without necessarily disclosing how it is computed, should be any more of a military secret than the number of planes.

THEORETICALLY, the secrecy regarding production rates on aviation gasoline is tied to the possibility that enemies could convert volumes of fuel back into terms of planes. Still, the WPB and various other agencies make monthly reports on the number of new ships launched, the number of planes produced and manufacturing schedules for the next 18 months, or longer. Recently the Army disclosed that plane losses, originally calculated to run 20 per cent of those in combat, is actually much lower, 7 per cent to be specific. With plane production figures at hand, the loss factor and a pencil gives any enemy agent just about all he needs to figure how many fighters and bombers are available.

NOW arises the question of why the industry is entitled to more specific information on aviation-fuel production. Much of the flexibility that has prevailed so far in meeting unexpected calls for petroleum products depends on the type and number of manufacturing plants in operation. With more specific knowledge of where the industry stands, what is expected of it in the matter of aviation gasoline would tend to accomplish the objectives much faster and with less confusion. There will be 60 plants producing 100-octane gasoline at the end of summer, according to Bruce K. Brown, deputy petroleum administrator in charge of refining. Aviation gasoline production has tripled in the last year. More is urgently needed, the authorities tell us. Still the industry which is expected to supply this critical material isn't permitted to know the actual objectives and a substantial part of the potential source is groping in the dark.



# North Texas Crude-Price Ceiling Lifted to Parity With Mid-Continent Oils

WASHINGTON, D. C.—Three local increases in crude-oil prices were announced by OPA this week, all effective May 22.

Crude produced in the Ville Platte field in Louisiana was increased 10 cents per barrel, bringing it to $1.30. OPA said this brings it into line with nearby fields and that purchasers have agreed not to pass on the increase to consumers.

An increase of 4 cents per barrel was granted for North and North Central Texas and in the Red River bed in Tillman County, Oklahoma, bringing the ceiling to $1.25 per barrel for 40-gravity crude. OPA said the old lower ceilings were due to increased production in other fields at the time ceilings were set and the increase puts these areas on the same basis as similar crude produced in other parts of Oklahoma.

In the Tinsley field, Mississippi, an increase of 11.44 cents per barrel was granted, bringing the price of 40-gravity crude to $1.18. OPA said ceilings in the Tinsley field had been based on a lower price in that area due to lack of a pipe line to the purchasing refinery but present output is going to new localities and the action lifts Tinsley to the level of comparable crudes in the same area.

# Pressure on OPA Intensified for Reconsideration of Oil Decision

WASHINGTON, D. C.—Strong pressure is being put on the Office of Price Administration to reconsider its refusal to approve an increase in the price of crude oil, but apparently James F. Byrnes, director of the Office of Economic Stabilization, is exerting equally strong pressure to hold down oil and all other commodity prices.

The oil industry, through dozens of spokesmen, has unanimously disapproved the OPA alternate proposal for a government drilling subsidy to stimulate new exploration, and no change in the crude-price situation is expected for some time, at least not until the Petroleum Industry War Council submits a new request supported by additional data and arguments.

At a press conference last week Petroleum Administrator Ickes said that he has discussed the oil price situation informally with Administrator Prentiss M. Brown of OPA but had not won him over to his views. He said he had asked Mr. Brown to reconsider the matter and that if this failed to bring the desired results he would present the case to Director Byrnes. PAW is not working on any plans for a drilling bonus or other form of subsidy, he added and declared that he has always been opposed to putting the Government into the oil business through this or any other means.

Members of Congress from oil-producing states have been highly critical of the OPA action, expressing themselves both in public speeches and in letters to Administrator Brown.

A resolution declaring it to be the sense of the House of Representatives that the president should act immediately to raise the price of crude oil by 35 cents per barrel has been introduced by Rep. Wright Patman of Texas, chairman of the small business committee which recently held hearings on oil production problems.

## Arkansas Fuel Conversion Project Canceled by WPB

WASHINGTON, D. C.—The War Production Board has revoked preference ratings and halted construction on additions and alterations to a "poly" gasoline unit of the Arkansas Fuel Oil Co., Shreveport, La. The plant was to produce butadiene.

The project was halted when it was indicated that it could not be completed in time to be fully effective in the war effort. Estimated total cost of the work was $315,359.

## Michigan Fields Granted Relief in Well Spacing

WASHINGTON, D. C.—A comprehensive plan affecting spacing requirements for the drilling of shallow oil wells in 12 counties in southwestern Michigan was announced May 18 by the Petroleum Administration for War in Supplementary Order 7 to Petroleum Administrative Order 11.

In the counties of Allegan, Barry, Berrien, Branch, Calhoun, Cass, Kalamazoo, Kent, Muskegon, Ottawa, St. Joseph and Van Buren, oil wells may be drilled or deepened to depths not greater than 2,000 ft. on a basis of 20 acres per well, instead of the 40 acres per well required by the general terms of PAO 11.

Wells complying with the 20-acre spacing requirement of Supplementary Order 7 are eligible for priorities assistance in securing necessary materials without any application for an exception to PAO 11.

## Gasoline Consumption Curve Turns Upward

NEW YORK.—Daily average domestic consumption of gasoline rose nearly 5,000,000 gal. in February compared to January, it was shown last week by the American Petroleum Institute monthly summary based on state-tax returns.

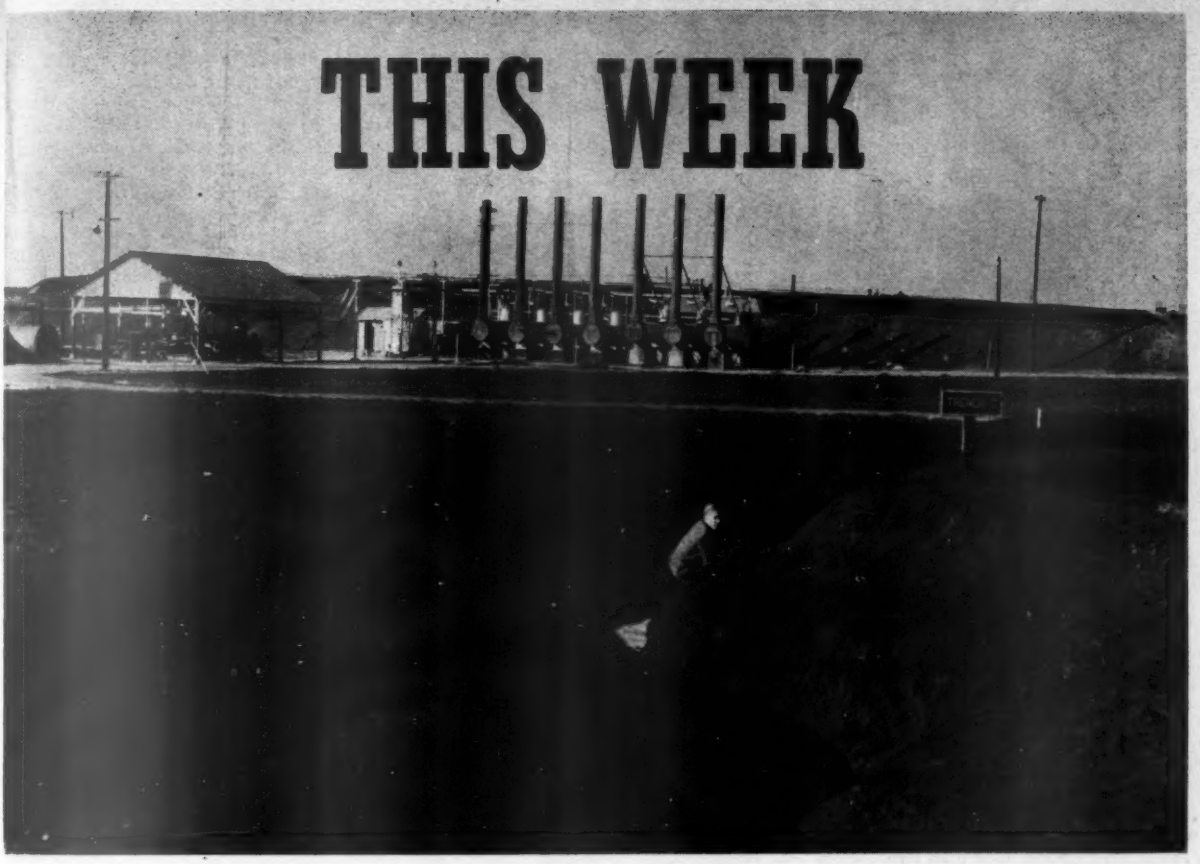
Despite the rise in February, consumption for the first 2 months of this year remained 24.81 per cent below the comparable figures for 1942. In January, however, a decline of 29.5 per cent from the 1942 rate of consumption was indicated.

Consumption of 49,360,000 gal. daily in February compares with 61,305,000 gal. per day in the same month a year ago, a reduction this year of 19.48 per cent.

Part of the moderation of the decline in gasoline consumption is the result of greater requirements this year in agricultural and industrial operations which probably will become increasingly important factors when data are available for spring and summer months.

Mississippi, New Mexico and Tennessee are the only states out of the 48 and the District of Columbia in which February 1943 consumption of gasoline exceeded 1942 figures.

# THIS WEEK



*This bomb trench at a California refinery is symbolic of protective facilities becoming more common in the industry*

**MATERIALS**—Amended P-98-b finally emerges. . . . Provides machinery for acquiring capital supplies, for plant additions, new construction. . . . Ties industry's material procedure more specifically into Controlled Materials Plan. . . . Assigns more responsibility to district offices of PAW. . . . Purchase orders conforming to regulations, qualifying under specific restrictions, gain greater assurance of fulfillment. . . .

**PRODUCTION**—Amendments to PAO 11, liberalizing spacing restrictions in eastern Oklahoma, Kansas, North and North Central Texas still pending. . . . ¶Twelve Michigan counties granted modification for 2,000-ft. wells.

**PRICES**—Crude ceilings lifted 4 cents in North and North Central Texas. . . .Revision establishes parity with Mid-Continent crude, effective May 22. . . . Purchasers promptly post higher prices, permitted by OPA in RSP 88, Amendment 97. . . . ¶Strong pressure continues on Prentiss Brown to reconsider rejection of price advance. . . . OPA boss now questions his authority to modify crude ceilings. . . . Recants previous declaration that it would be his duty to lift prices, IF such action would further war program. . . . ¶Ceilings also raised on Tinsley and Ville Platte crudes. . . .

**REFINING**—Crude shortage in Pennsylvania growing more critical. . . . Plants threatened with shut downs or sharply curtailed operations. . . . ¶Agreement reported between Mexico and United States for 5,000-bbl., 100-octane plant in former country. . . . ¶Mid-Continent operators move promptly to manufacture higher percentage of gasoline, to meet demands from agricultural districts. . . . ¶Arkansas Fuel Oil Co.'s butadiene-conversion project cancelled. . . .

**TRANSPORTATION**—Products line from Albany, N. Y., to Boston, Mass., a combination 10 and 8-in. system, receiving consideration. . . . Plan supplants earlier proposal for 20-in. line from Linden, N. J., to Boston. . . . ¶New peak of 965,582 bbl. daily established in tank-car deliveries to East Coast. . . .

**SUPPLIES**—Inventories of principal products on East Coast dwindle to 25.5 per cent of normal. . . .¶Shipping activity on Gulf Coast gives added evidence of exceedingly high offshore movement. . . . ¶Relief from present restrictions on consumers impossible; tighter regulations, on the other hand, more probable. . . .

**MANPOWER**—PAW sponsoring industry-wide study of uniform job classification and replacement schedules. . . . California work most advanced, completion of program probable in 2 weeks. . . . Objectives are to retain key men, those essential to operation, give selective service boards factual basis for granting deferments. . . . Drilling and refining branches chief sufferers so far. . . .

# Products Line From Albany To Boston Being Considered

NEW YORK. — Consideration is being given to a 165-mile pipe connecting Albany, N. Y., and Boston, Mass., by the District 1 transportation committee and the temporary joint pipe-line engineering subcommittee. The principal purpose of the line would be to insure deliveries of oil products to New England during the wintertime.

According to present plans the line would be of 10-in. diameter from Rensselaer, N. Y., on the east bank of the Hudson River across from Albany, to West Boylston in East Central Massachusetts, and 8 in. from that point to Boston. The 10-in. section would have a capacity of 60,000 bbl. per day and the 8-in. section 36,000.

The route of the line would be southeast from Rensselaer, crossing the Berkshire Mountains in the vicinity of Pittsfield, Mass., and proceeding southeast to Northampton, Mass. From there it would move eastward, skirting the southern end of Quabbin Reservoir and then tend north slightly to West Boylston, which is near Worcester, Mass., and almost directly west of Boston. Existing facilities at Rensselaer and in the Everett-Boston area would provide the necessary tankage.

### Chiefly for Heating Oils

The line would be used primarily for heating oil and kerosene, two products which were critically short in the Boston area during the past winter. These products would be transported to Albany by rail over the New York Central lines. By moving them from that point to Boston several days' tank-car time would be saved. It is estimated that this move would result in the release of 1,000 tank cars which, if they were used exclusively in transporting products from the Gulf, would enable the delivery of an additional 10,000 bbl. per day to the Northeast.

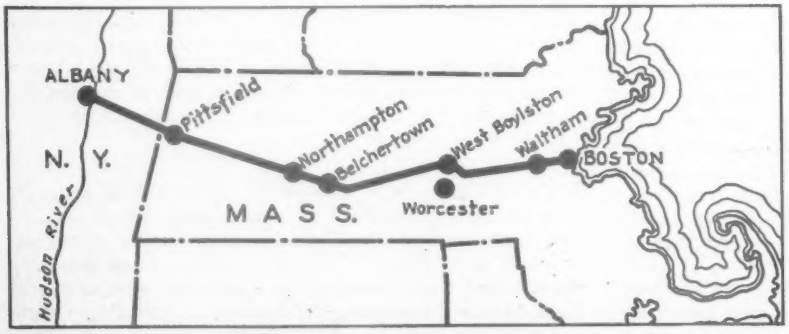
Additional quantities of oil may be made available for shipment through the line by way of the New York Barge Canal and also by barging products up the Hudson River from the Bayonne-Bayway refining area. The former would of course be limited by the amount available for transportation through the canal from Buffalo.

### Earlier Proposal Replaced

The proposal to construct this line supplants an earlier proposal to extend the 20-in. products line from the Linden, N. J., area to Boston. The earlier proposal called for the laying of an extension from Linden by way of Peekskill, N. Y., Waterbury and Hartford, Conn., and Worcester, Mass., to Boston. This line would have been 260 miles long and would have cost an estimated $8,000,000, possibly 60 per cent more than the proposed substitute. In addition it would have involved the crossing of more rivers and water sheds, making both the risks and liabilities heavier. Most important is the fact that it could not be completed this year, while the other one can be.

In passing just north of Springfield and Worcester and touching West Boylston, it would be possible for the line now proposed to connect with existing lines if this were found advisable. Shell's Massachusetts system runs from Fall River to Waltham with a branch to West Boylston while the Socony-Vacuum system serves both Worcester and Springfield from Providence. An extension connects Hartford, Conn., with Springfield.

The Albany-Boston line would not be attractive from a postwar standpoint as an eastbound carrier. However, it is possible that the eastern half of the line could be reversed so that it could augment existing lines in supplying central and western Massachusetts from Boston. Since the rest of the territory it would serve if the flow were reversed can be supplied economically otherwise, the section west of Northampton probably would be valueless.




*Route of the proposed products line*

## Shell Joins Illinois and Mid-Continent Divisions

Consolidation of the eastern area, formerly operated out of headquarters at Centralia, Ill., with the Mid-Continent division and transfer of most of the personnel to Tulsa was announced last week by Shell Oil Co., Inc.

H. E. Rankin has been appointed division geologist, replacing L. M. Clerk, who has been transferred to the Los Angeles, Calif., office on special assignment.

E. P. Davis, head of the title and rental section at Centralia, will be transferred to Tulsa. J. T. Lamb, eastern division legal manager, Jess Davis, Mark Dunlop, and James P. Mize, all members of the legal staff, will be transferred to Tulsa. C. R. Bickel and C. W. Talbot, division managers of the production and land departments, respectively, will remain at Centralia.

## Protest Filed Against Federal Land Unitization

CASPER, Wyo.—At least one strong protest against the proposed unitization of oil and gas leases in the public domain has been filed with Secretary of the Interior Ickes.

L. N. Hagood, Casper, and Sacramento, Calif., attorney, who has been active in organizing unit operating plans on public lands, has written Secretary Ickes protesting particularly emphatically against the "financial capacity" requirement in the proposed regulation. Mr. Hagood declares that procedures and policies proposed in the U. S. Geological Survey's plans would exclude most independent operators and small companies from exploring in the public domain and would, because of the stringent terms regarding "financial capacity" and "penalty bonds," reserve this function almost exclusively for major companies.

"The proposed form of unit agreement," Mr. Hagood wrote, "is excessively cumbersome even for proved and producing oil and gas fields. At least it should be confined to them and not apply to exploration units."

# Changes in Basic Equipment Regulation Clarifies Access to Operating Supplies

WASHINGTON, D. C. — An improved method of securing new materials for discovery, development and depletion of oil and gas fields, for construction operations and for maintenance, repair and operating supplies was provided last week by issuance of amended Preference Rating Order P-98-b.

The new order divides operators seeking material for discovery, development and depletion operations operations into two groups:

1. Operators who drilled 40,000 ft. of hole or more during 1942.

2. All other domestic operators and Canadian operators.

To obtain controlled materials, the large United States oil producers must submit for approval Form PD-873, filled out in detail to show the quantity of controlled materials required, at least 4 months prior to the calendar quarter in which such material is to be delivered. This form must be filed with the PAW district office for the area in which the material is to be used. When PD-873 is approved, an allotment number and preference rating will be assigned which may be used on delivery orders without further submission to PAW.

**Small Operators' Procedure**

The small United States oil producers and the Canadian operators will obtain controlled materials by filing Form PD-873 with either PAW district offices or the Canadian oil controller not less than 1 month prior to the time material is to be delivered. An allotment number and preference rating will be assigned which may be used on delivery orders without further submission to PAW.

The manufacturers and suppliers of tubular goods will know that the advance orders on their books from the large United States operators will represent on an average one-half of the total United States requirements. They will arrange their production scheduling and inventories accordingly.

To obtain noncontrolled materials, all production operators must submit copies of delivery orders for $100 or more to either PAW district offices or the Canadian oil controller, showing the serial number assigned on Form PD-873 and the use to which the material is to be put. If a single item is $500, or more, or the total is $1,000 or more, approval must be obtained prior to placing the order. If no single item is $500 of more and total is less than $1,000, approval is not required and copy of delivery order is filed for information purposes only.

Text of amended P-98-b, the industry's basic equipment order for the indefinite future, starts on page 45 of this issue. This summary and interpretation outlines the chief provisions and is supplementary to the text. The outstanding change in the new order is inclusion of procedure for obtaining capital equipment needed in expansion or new construction. Furthermore, the new order ties equipment purchases directly into CMP.

The method of securing both controlled and noncontrolled materials for construction for marketing, natural gasoline, refining or transportation projects is set forth clearly in tabular form in Schedule E of the order and in all cases requires the use of Form PD-200 to obtain priorities assistance.

Materials for maintenance, repair and operating supplies (MRO) for all branches of the petroleum industry may be secured by the use of a preference rating of AA-1 and an allotment symbol MRO-P-98-b, subject to the following conditions:

1. Aluminum for MRO may not be obtained in amounts exceeding 100 lb. per calendar quarter year, except by special allotment from the Aluminum and Magnesium Division of the War Production Board in Washington.

2. When the cost of any single item is $500 or more, prior submission of the delivery order to Washington PAW office or Canadian controller for approval is required for all branches except domestic production. For domestic production purposes, such orders must be submitted to the PAW district office for approval.

3. When the total cost of all items is $1,000 or more, but no single item is $500 or more, prior submission of the delivery order to the PAW district offices or the controller for approval is required.

4. When the total cost of all items is less than $1,000, but more than $100, with no single item of $500 or more, copy of delivery order, for information only, must be submitted to the PAW district office or to the controller. Approval is not required, unless steel valves, cast-iron valves over 12 in. or industrial-control instruments are involved. In such cases the special provisions of Schedule D of the order apply.

5. Emergencies involving actual breakdown or suspension of operations will be handled by telephone, telegram or letter to the PAW Washington office, furnishing certain information indicated in the order.

There are four general provisions in the order that apply to production, construction and MRO operations alike:

1. Petroleum operators are not subject to the provisions of CMP Regulations 2, 5 and 6, or paragraphs (i), (s), (s-1) and (u) of CMP Regulation 1; nor shall the provisions of WPB Limitation Order L-41 apply to operators under P-98-b.

2. An operator in the case of production or contruction project, may, if necessary, allocate a part of his controlled materials allotment to a Class A controlled-material product manufacturer, or to a contractor (each of whom then becomes a secondary consumer) for reallotment or the placement of controlled material orders.

3. Any delivery order placed in accordance with the terms of P-98-b shall constitute an authorized controlled-material order and shall be rated and have the same status as though placed under CMP Regulation 3.

4. Paragraph (L) gives one form of certification which may be used on all delivery orders, instead of the multiplicity of such forms required under numerous CMP regulations.

## River Crossing Break Halts WEP Crude Runs

CINCINNATI, Ohio.—Ten days delay in crude movement through the War Emergency Pipelines, Inc., 24-in. system will be incurred by a break this week at the Arkansas River crossing.

# Closing of Some Pennsylvania Refineries Probable Because of Crude Shortages

*by J. P. O'Donnell*

NEW YORK.—The increasingly critical condition of the Pennsylvania Grade crude-oil region, an important source of aviation lubricating oils, was indicated last week when the South Penn Oil Co., largest producer and purchaser of this grade of oil, announced that, effective June 1, it would reduce sales to refineries to 85 per cent and, effective July 1, to 80 per cent of the amount sold in May. This was the first public announcement that proration of refineries would be undertaken, but actually it has been in effect for some time with some refineries having been unable to obtain sufficient supplies to maintain maximum operation for several months.

Factors which are responsible for this situation are illustrated in the accompanying figure charting the trend of Pennsylvania Grade crude-oil production and runs to stills for the past 28 months and the effect of this trend on stocks. Since the last few months of 1940 there has been an almost uninterrupted drain on stocks as a result of the continuous excess of runs to stills over production. This excess existed through all but 5 of the past 32 months, ranging from 400 bbl. to 8,600 bbl. per day.

The effect of this excessive demand since the first of 1941 is shown in the chart. Total stocks dropped from 4,036,000 bbl. on January 1, 1941, to an estimated 2,315,000 bbl. on May 1, 1943. As impressive as this 42.5 per cent reduction is, it becomes even more so when stocks are regarded in the light of their availability for sale to refineries. It has been estimated that 1,750,000 bbl. of the total comprise pipe-line working stocks and tank bottoms and possibly 400,000 bbl. are refinery stocks. Therefore the amount actually available for sale to refineries dropped from around 1,900,000 bbl. on January 1, 1941, to possibly 165,000 bbl. on May 1, 1943, a decline of more than 90 per cent.

Since the first of the year Pennsylvania runs to stills have averaged 75,000 bbl. per day so that stocks on May 1, actually available for sale to refineries, were equivalent to only slightly more than 2 days' supply on the basis of existing demand. During these 4 months runs to stills exceeded production by an average of 2,750 bbl. per day with a corresponding drain on stocks. At this rate all remaining available stocks would be entirely exhausted by July 1.

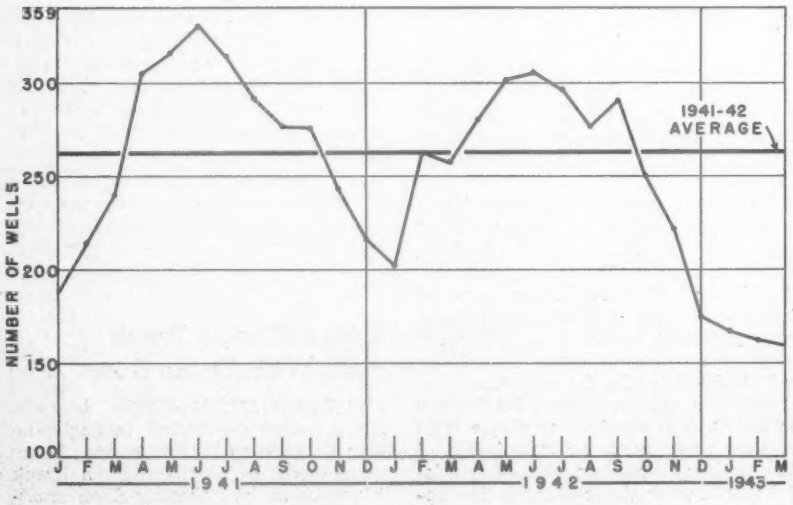
Even though they have been processing more crude oil than has been produced in the past 2 years, Pennsylvania refiners have not added to the stocks of lubricating oil suitable for war requirements. Aviation lubricating oil consists principally of bright stock and inventories of this product are seasonally but not seriously low following a substantial reduction in March. On the other hand, stocks of neutrals, normally the principal constituent of motor oils, have increased substantially because of the loss of the motor-car market. The marked change in the inventory position of Pennsylvania bright stocks and neutrals is shown in the accompanying table.

**TREND OF LUBRICATING STOCKS**

| Date— | Bright stocks (bbl.) | Neutrals (bbl.) |
|---|---|---|
| March 31, 1943 | 295,627 | 496,908 |
| March 31, 1942 | 306,021 | 179,500 |
| March 31, 1941 | 458,458 | 195,662 |

This problem would be corrected to a large extent if the PAW-proposed plan of restricting heavy oils for aircraft consumption and of using lighter oils consisting almost entirely of neutrals for motor-car consumption were adopted. It is pointed out that some oils, normally regarded as unsuitable in themselves for motor-car lubrication, would be entirely suitable for this purpose now due to the lower speeds and reduced mileage at which cars are now operating as a result of tire and gasoline rationing. While such a plan would assure a market for bright stock and would develop a larger one for neutrals, it would not answer the principal problem facing the Pennsylvania industry, that of crude-oil supply. It is possible that the latest developments in the Pennsylvania picture will precipitate the issuance of the long pending "stop" order restricting bright-stock sales.

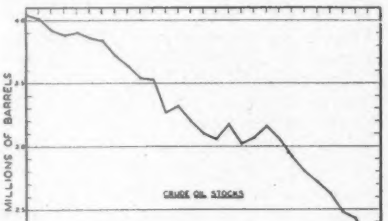
This possibility may have been enhanced by the fact that included among those refineries which have not been able to obtain their full crude-oil requirements are several which have been producing a large proportion of war products. In some




*The course of completions shows why supplies are lagging*

quarters it is regarded as a probability that these refiners will appeal to federal authorities for relief. In light of the existing crude-oil-supply situation, the only way they could be given relief would be to take over the crude supply of refineries not directly producing war material. This would involve a crude-oil allocation program.

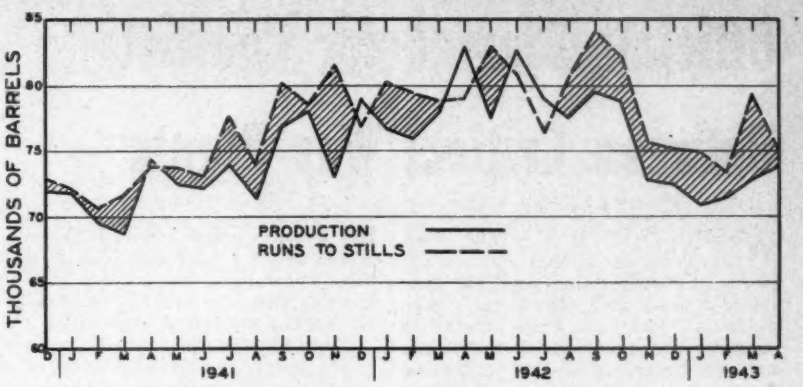
The 15 and later 20 per cent reduction affecting those refineries supplied by the South Penn Oil Co. will also be a severe blow to refinery economics. It will reduce the refineries' throughput by that amount while operating costs will remain virtually unchanged. Therefore the cost per barrel of finished products will be higher. Theoretically a 20 per cent reduction in runs would increase operating costs 25 per cent per barrel. Some of the companies which obtain their crude-oil supplies from other sources than South Penn have been hit even harder with their supplies having already been reduced more than 15 per cent. In these instances the cost per




*Decline of crude stocks has continued with minor variations for more than 2 years*

barrel of finished products has already advanced considerably with the possibility that refineries so affected are now operating at a loss. These higher costs, incident to lower throughput, will make an increase in ceiling prices of refined products or the closing of some refineries inevitable. Another factor which will probably contribute to the closing of refineries is the fact that some manufacturers purchase crude oil on a month-to-month basis. Since suppliers are finding it impossible to meet the requirements of long-term contract buyers, refineries operating on a month-to-month basis will probably find it impossible to purchase crude oil.

The current shortage of Pennsylvania crude is attributed principally to the fact that even with the comparatively high prices in effect today, operation of properties in these fields is generally uneconomic. The need for higher Pennsylvania crude prices became evident early in 1941 and they were advanced four times, aggregating 60 cents per barrel, in the first 6 months of that year. Another advance was posted in August 1941, but was rescinded by OPA, and it was not until March 26, 1942, that a further increase was allowed, a lapse of 9 months. In the interim, increasing costs and taxes more than offset the advantage resulting from the belated advance which lifted prices to a range of $2.55 to $3 per barrel.




*Shaded field shows deficiency of production below refinery runs*

### Bradford Reflects Condition

The effect of this uneconomic condition is apparent in the Bradford field, source of approximately 55 per cent of Pennsylvania Grade crude production. In the first quarter of this year completions in this field were almost 30 per cent below the average of the corresponding periods of the 2 preceding years. Costs of producing oil in this field are growing progressively greater. This is a result of the fact that it has been intensively developed over the past 15 years during which possibly 35,000 oil-producing and water-intake wells have been drilled. Naturally the properties most susceptible to water flooding were developed first so that, after such intensive development, it is obvious that properties yet undeveloped are in a much higher development-cost category.

While the decline in drilling activity in the Bradford field has been most pronounced, it has been even greater in the Middle district and lower Pennsylvania fields. Except for a large experimental water-flood project near Clintonville, activity in the Middle district fields is practically at a standstill. This area is the most suitable in the Pennsylvania region for air and gas repressuring where it has been undertaken on a fairly large number of widely scattered properties. For this reason it was expected to provide an increasingly larger volume of Pennsylvania Grade crude oil. Inability to operate profitably has halted progress in this direction. The horizontal drilling experiment near Franklin, Pa., which Middle district operators are watching hopefully is reported to be progressing with the shaft and working chamber completed and equipment for drilling the horizontal wells having been moved in recently. If this experiment proves to be an economic success, it may revitalize the entire shallow sand area.

Since latest reports show that Pennsylvania bright-stock inventories are in good shape and since the aviation-lube situation at the moment is somewhat tight but not acute, the effect of these developments in Pennsylvania will probably not be felt immediately on the war program. However, if growing aviation demands in the future require maximum production of Pennsylvania bright stock, a shortage would result. This shortage will grow progressively worse unless some remedial action is taken soon enough to prevent a further decline in the Pennsylvania region's productive capacity.

**Shortages of crude at Pennsylvania refineries is growing more acute. Time is taking an inevitable toll in productive capacity of existing fields which are suffering from lack of drilling. This summary points out that withdrawals from stocks to supplement current production have brought inventories down to a working minimum.**

## Rail Purchases of Fuel Oil Rise Nearly 30 Per Cent

WASHINGTON, D. C.—Purchases of fuel oil last year by Class 1 railroads totaled $99,767,000, according to an analysis released here last week by the Association of American Railroads. The dollar volume of fuel-oil purchases was nearly 30 per cent greater than reported in 1941.

# Officials Blamed for Conflicts Between Critical War Plants

WASHINGTON, D. C. — The basic reason for the current conflict between the 100-octane gasoline, synthetic-rubber, and escort-vessel programs is the failure of the officials in charge to cooperate and to realize the need for balancing all war production programs with each other, the Truman war investigating committee reported to the Senate late last week.

Only 2 days after closing its hearings on the subject, the committee issued its report, mentioning no names but severely criticizing all the officials concerned for making public charges about each other. It recommended further centralization of authority in the War Production Board, and declared that the persons in charge of each major program should sit on the WPB and take part in its decisions. The report made no mention of the fact that Petroleum Administrator Ickes has recently been named a member of WPB.

No figures were given in the report regarding the objectives or present status of the aviation-gasoline and synthetic-rubber programs, and its entire brief text was devoted to a discussion of the administrative problems and the need for balancing the conflicting programs with each other.

By inference Rubber Director Jeffers and Petroleum Administrator Ickes were criticized for attempting to push their programs to the detriment of others, and WPB Chairman Nelson was criticized for not exercising his powers and authority more sternly. The committee noted that last December and January "the contest between rubber and aviation gasoline became too hot for the WPB to handle, and was finally decided after appeal to higher authority."

Other excerpts from the report are:

"At the present time the order of expediting the various programs is considered settled by the War Production Board. A vigorous effort to schedule production is under way, apparently with the hearty approval of all concerned.

"Vigorous, able men are now at work on these programs attempting to make up ground lost because of our failure to set our sights high enough. There is a perfectly normal and healthy tendency on the part of each leader to view his program as the most important. Each has complained to the committee that his program has been treated inequitably.

"The precise balancing of these programs in point of quantity and of time is crucial. A serious error could spell disaster. The deciding agency must have the facts concerning all programs before it. Its decisions must stick. Confusion in planning today will cut production a year hence. It defeats strategy. Weakness in enforcing decisions will breed confusion.

"An administrator was placed in charge of petroleum programs, including aviation gasoline. The executive order declares that he 'shall be directly responsible to the president.' On the other hand, he exercises the 'powers, authority, and discretion conferred upon the Chairman of the War Production Board' with respect to the petroleum industry, 'subject to the direction of the Chairman of the War Production Board'. The lines of authority are confusing even on paper. As a practical matter they breed disputes such as that under consideration.

"The War Production Board is serving well as a scheduling and allocating agency. It has succeeded in deciding between claimant programs and in providing materials within the limitations of the conditions under which it has been forced to work. In this field the War Production Board and its chairman have been successful, and his authority should be sustained."

## Exploration Incentives Raised on Public Land

WASHINGTON, D. C.—Regulations which in some instances would make possible a government reward of more than 100 per cent for the discovery and development of new sources of petroleum for the war program have just been put into effect by the General Land Office, it was announced May 7 by Secretary of the Interior Harold L. Ickes.

Designed to effect an increase in prospecting for new sources of petroleum, in accordance with provisions of the O'Mahoney act of December 24, 1942, regulations establish a flat royalty rate of 12½ per cent for 10 years following date of discovery, if discovery is made during the period of the national emergency.

Prior to the enactment of the legislation, the royalties paid the Government for the production of petroleum ranged from 12½ to 32 per cent, dependent upon the amount of the petroleum produced from the wells. By setting the limit at 12½ per cent for the next 10 years for production from a new field or deposit, the regulations afford opportunity for increased prof-

Journal Photo by Suttle

*When the petroleum industry divided up proceeds from the scrap-rubber drive recently in Washington these high officials participated, Jesse Jones, secretary of commerce; James F. Byrnes, director of the Office of Economic Stabilization; W. R. Boyd, Jr., chairman of PIWC; Administrator Ickes; Donald M. Nelson, chairman of WPB; Frank Knox, secretary of Navy, and Chester I. Barnard, president of USO*

its more than double those under the previous maximum royalty payments required.

Under the regulations, a discovery of oil or gas within the area of any geologic trap in which no discovery theretofore had been made shall be deemed to constitute a discovery of a new oil or gas field within the meaning of the act.

The law does not apply to discoveries made prior to the enactment of the legislation, nor to leases carrying a royalty of less than 12½ per cent.

To receive the royalty benefits on a new discovery, application must be submitted to the appropriate district headquarters of the General Land Office.

## Fell Becomes Member of PIWC as District 2 Officer

Harold B. Fell, president of the Simpson-Fell Oil Co., Ardmore, Okla., last week became the newest member of the Petroleum Industry War Council. His was an ex officio appointment by Ralph K. Davies, PAW deputy administrator. Mr. Fell is executive vice president of the Independent Petroleum Association of America. His appointment to PIWC followed automatically his selection as chairman of the District 2 production committee, succeeding Otto D. Donnell, who became general chairman of District 2.

*H. B. FELL*

## Chinese Field Has 14 Wells

Fourteen producing oil wells have been completed in China's new oil field in the Province of Kansu, according to the China Information Committee which credits the discovery and exploitation to the National Resources Commission of the Ministry of Economic Affairs.

# Federal Order Digest

### Petroleum Administration Orders

**Petroleum Supplies**—PAO 1, amended: Orders suppliers to give preference to any person using gasoline for nonhighway farm purposes; removes 10-day inventory restriction on fuel oil, effective May 14.

### WPB Regulations

**Materials**—PRO P-98-b, amended: Revises method of securing new materials through PAW for discovery, development and depletion of fields, for construction operations and for maintenance, repair and operating supplies, effective May 15.

**Precedence of Purchase**—PR 18: Prohibits producers from interfering with any frozen production or delivery schedule by eliminating, displacing or altering the precedence of any purchase order listed for production and delivery, issued May 11.

**Controlled Materials**—CMPR 1, Interpretation 6: Authorizes placement of orders, in certain cases, for Class A products without an accompanying allotment of controlled material and such orders may bear the appropriate allotment number as well as the preference rating, issued May 10.

**Inventories**—GLO L-219, Interpretation 1: Deals with questions relating to such things as imported goods, "swaps" of inventories between merchants, calculation of allowable receipts and other problems arising from operation of the order, issued May 8.

**Conveying Machinery**—GLO L-193, amended: Restricts purchase orders for conveying machinery and mechanical power transmission equipment to those rated AA-5 or higher, issued May 10.

**Synthetic Rubber** — AO M-153, M-170 and M-178, amended: Simplifies authorization forms for the use and delivery of styrene, butadiene and acrylonitrile, specifying use of Form PD-602, in place of PD-600 and PD-601, issued May 8.

**Steel Pipe Fittings** — GLO L-278, Reduces the number of types of steel pipe fittings authorized for manufacture from 38,784 to 3,615, issued May 8.

**Heating Equipment**—SD 1, amended: Authorizes OPA to ration new heating equipment but does not delegate power to restrict the quantity produced, issued May 8.

### OPA Price Regulations

**Crude Prices**—RPS 88, Amendment 97: Permits rise in ceiling prices in Tinsley field, Mississippi; Ville Platte, Louisiana, and North and North Central Texas, effective May 22.

**Product Prices**—RPS 88, Amendment 96: Authorizes sellers in Puerto Rico to pass on to purchasers a 3 per cent excise tax on contract sales to the insular government, effective May 10.

**Product Prices**—MPR 137, Amendment 33: Permits retailers in Puerto Rico to pass on to purchasers 3 per cent excise tax, effective May 10.

**Glycerin** — MPR 38, revised: Fits price regulation on sales of crude and refined glycerin more exactly to conditions in the industry; concerned chiefly with clarifying definitions, effective May 17.

**Asphalt**—MPR 323, Amendment 3: Establishes a flat dollar-and-cents mark up of $2.50 per ton on asphalt received by a dealer, reseller or refiner, effective May 15.

**Adjustments on War Goods**—PR 6, Amendment 2: Makes changes designed to improve and clarify procedure for handling price adjustment applications on war goods, effective May 17.

### OPA Rationing Orders

**Gasoline**—RO 5-c, Amendment 48: Broadens power of War Price and Rationing Boards to revoke gasoline rations of motorists and other users; establishes hearing procedure for individual, effective May 11.

**Gasoline**—RO 5-c, Amendment 49: Establishes procedure for renewing basic gasoline rations (A and D coupon books) by mail, effective May 21.

**Gasoline**—RO 5-c, Amendment 47: Grants members of the armed forces on leave or furlough for 3 days or more special ration up to 5 gal., effective May 14.

**Fuel Oil**—Declaration of Policy: Removes convertibility tests, whether householder can or cannot convert oil furnace to use coal or wood, from next season's domestic fuel-oil rations, issued May 10.

### Defense Transportation Rules

**Truck Conservation**—Specifies 25 gal. as minimum oil truck delivery to farms after June 1.

**Truck Speeds**—ODT Order 23-2-a, extended: Trucks displaying V Emergency Pennants and carrying Certificates of Exemption may continue speeds in excess of 35 miles per hour, making emergency delivery for the Army, Navy, Maritime Commission and War Shipping Administration.

# LETTERS

## Writer Seeks Division of Reserves Into Discovered and Undiscovered Classes to Avoid Common Confusion

THE writer believes that proper terminology in respect to the domestic oil reserves is to refer to the same in two parts: (1) The discovered reserve; (2) the undiscovered reserve. This avoids confusion as to the meaning of the term "proven or known reserves." When we refer to the estimates on the proven reserves in the United States, the public may easily interpret this to mean that the estimate refers to all the oil left in this country. Then, by dividing the annual consumption into this figure, it looks as if a few more years means exhaustion of oil.

Annual "oil finding" is a crop. We are told that to raise a proper crop in 1943 it is necessary to drill 4,500 exploratory wells. Since the refining and distributing units should profit from discovered reserves and the small producers profit solely from production it is natural that the oil industry would prefer that 4,500 or more do the exploration. The prospector must lay the foundation for production, refining and distribution. With success he thus adds to the national annual wealth. Putting first things first, he is it; keeping an eye on him is keeping an eye on the ball. The prospector usually gets a dry hole, and then another, so that when he does make a discovery the product has cost him a lot per barrel in finding it. On low-priced crude, out of line with costs, he moves slowly by necessity; with proper prices, he can get busy.

From our "undiscovered reserve" it is now obligatory to put more oil into the "discovered reserve" to prevent a serious shortage in the war effort and to do it quickly. With an increase of 50 cents per barrel in the crude-oil price, and sufficient materials and labor available, it is my opinion that it would only be a matter of reasonable time until the 4,500 wells are drilled and much of the same material used in drilling another 4,500 wells, with the result that the discovered reserve will be brought up to requirements.

I agree with the statements published by Alexander Deussen, A. I. Levorsen and other geologists that the undiscovered reserve is an abundant supply. The drilling rig is the best geological instrument that the geologist has for his use. There are thousands of places where he would like to use it provided he is given the green light and the purse strings are opened to him. The drillers are the best assistants to geology. Make the compensation sufficient and turn the legion loose! Under our economic system there is no other way to get results. Regardless of profits, the expense must be covered. The oil-finding business is moving slowly in the spring of 1943 and it seems that by necessity it will remain so provided the oil price stays frozen. Because of the prospecting element the business of discovering oil is distinctive from almost all other lines of business and must be viewed accordingly.

If delay in the increase of crude prices continues through the summer, it may require considerably more than 50 cents per barrel to get the oil-finding business off to effective activity. Recommendations for an increase of price without action thereon has put hundreds of drilling deals on the waiting list.

JAMES H. GARDNER,
Petroleum Geologist and President,
Gardner Petroleum Co., Tulsa.

## Egloff Reelected Head Of Chemists Institute

*GUSTAV EGLOFF*

CHICAGO.—Dr. Gustav Egloff, research director for Universal Oil Products Co., Chicago, last week was reelected president of the American Institute of Chemists which held its annual meeting here May 15.

Bruce K. Brown, assistant deputy petroleum administrator, delivered the paper of chief interest to petroleum chemists, saying that too much emphasis had been placed on the "competition" between the synthetic rubber and aviation-gasoline program and too little said of the intimate relationships. He said that 100-octane production has more than tripled in the last year despite difficulty of obtaining materials. The number of units in operation manufacturing 100-octane gasoline has increased to 42 compared with 23 at the time of Pearl Harbor, and will rise to 60 before the summer is passed.

Dr. Walter S. Landis, vice president, American Cyanamid Co., received the medal of the A.I.C. in recognition of his outstanding achievements in chemical development. Maxmillian Toch, president, Toch Brothers, Inc., spoke on "Landis, the Man," and H. L. Derby, president, American Cyanamid & Chemical Co., on "Landis, and His Achievements." R. J. Moore, manager development laboratories, Bakelite Corp., delivered a paper on "Synthetic Resin Plastics."

## ODT to Determine Tread Wear at Various Speeds

WASHINGTON, D. C.—A 60-day test of tire tread wear on over-the-road trucks was started by the Office of Defense Transportation on April 29.

The test, which is part of an ODT analysis of the effect of the 35-mile speed limit on the rubber-borne transportation services of the nation, will be conducted to determine specifically the degree of tread wear on tires of commercial motor vehicles under various speed limits, Mr. Eastman explained.

# State Capitals

## LOUISIANA

AN ORDER throwing open the public lands of the state to development under federal oil and gas leasing laws has been issued by Harold L. Ickes, secretary of the interior. Development of petroleum resources on the public lands in the state hitherto has been restricted by earlier orders withdrawing tracts of the public domain from such development.

## KANSAS

PRODUCERS and purchasers have been called to a meeting at Wichita May 25 to consider the proration schedule for June. The meeting will be held at the Allis Hotel, starting at 10 a.m. At the same hearing, the Corporation Commission will determine market demand for natural gas from the Cunningham and Otis fields for June, July and August.

## COLORADO

GOV. JOHN C. VIVIAN announced last week that he will sign the bill recently passed by the legislature authorizing Colorado to continue as a member of the Interstate Oil Compact as soon as it is returned from the office of the attorney general. The measure is subject to the final approval of Congress. Warwick M. Downing, of Denver, is the representative on the Compact Commission for Colorado.

FOUNDED IN 1910 BY PATRICK C. BOYLE the OIL AND GAS JOURNAL

# Some Postwar Aspects

IN common with many other industries there is a tendency in the oil business to go to extremes in projecting the probable postwar demands for petroleum products.

It is fitting and necessary that all industry give thought to what must be done as soon as peace arrives. These preparations will defeat their own ends, however, if they retard in any way the war efforts. The quicker the victory the easier the postwar adjustments in this country and the more certain that the entire world will most quickly benefit from the war's developments in manufacturing arts.

Regarding petroleum's future demands much has been said about a postwar car which will run 40 to 60 miles on a gallon of motor fuel. These observers have heard of the high-octane aviation gasolines and they have translated the increased power available from the superior fuel solely in terms of greater mileage.

The usual conclusion is that while the quality of gasoline will be much better after the war ends, the quantity required will be 25 to 50 per cent less than it was in prewar days.

These observations and others with a similar background overlook the basic fact that in this country's economic growth new developments in the industrial arts are evaluated as to the contributions they can make to a constantly improving standard of living. Cars with low gasoline consumption have been available in recent years and much more could have been done in engine performance in that regard if there had been a demand. Instead, the rapidly increasing sales went to the manufacturers who utilized the improved fuels for greater horsepower from which came a performance which accounts for the phenomenal and continued growth in automotive power.

There is no reason to assume that this trend will be reversed and that our postwar economy will follow the pattern of most European and Asiatic countries of doing without entirely or of getting along with the minimum.

At the other extreme is the highly optimistic viewpoint which assumes a continuance of present business activity without interruption. With a 135-billion-dollar yearly earning capacity and no reduction in the dollar's buying power, it is easy to visualize a large increase in the number of motor vehicles and in all other petroleum power and fuel applications accompanied with large gains in use per unit. This would bring unprecedented gains in over-all petroleum demands.

While there is plenty of evidence that the war will strengthen petroleum's position in the everyday living of the entire world with a new petrochemical industry definitely in the making, more harm than good will result from exaggerated assumptions as to petroleum requirements immediately following peace.

A resumption of prewar increases in petroleum demands is a reasonable expectation with later trends to be determined by world events which cannot be accurately gaged at this time.

The oil industry will have plenty to do over a long period in catching up with its normal operations which have been curtailed because of material shortages and other restrictions, and in adjusting all of its practices to new operating standards brought about by the war. Its first postwar responsibility will be to complete that job.

# Mexican Equipment Deal Expected to Center On Materials for Refineries

*by Curtis Vinson*

*EFRAIN BUENROSTRO*

**Priorities on equipment which may reach a value of $50,000,000 were reported last week to have been arranged by officials of Petroleos Mexicanos who are in this country for the specific purpose of negotiating for supplies with which to rehabilitate Mexican refineries and producing fields. Commitments for the equipment are reported to have been based on a reciprocal agreement, giving the United States prior claim to large volumes of Mexican oil expected to result from the agreement.**

MEXICO CITY. — When material and equipment for rehabilitation of the Mexican petroleum industry become available from the United States, such supplies are expected in informed circles here to center largely on refinery needs.

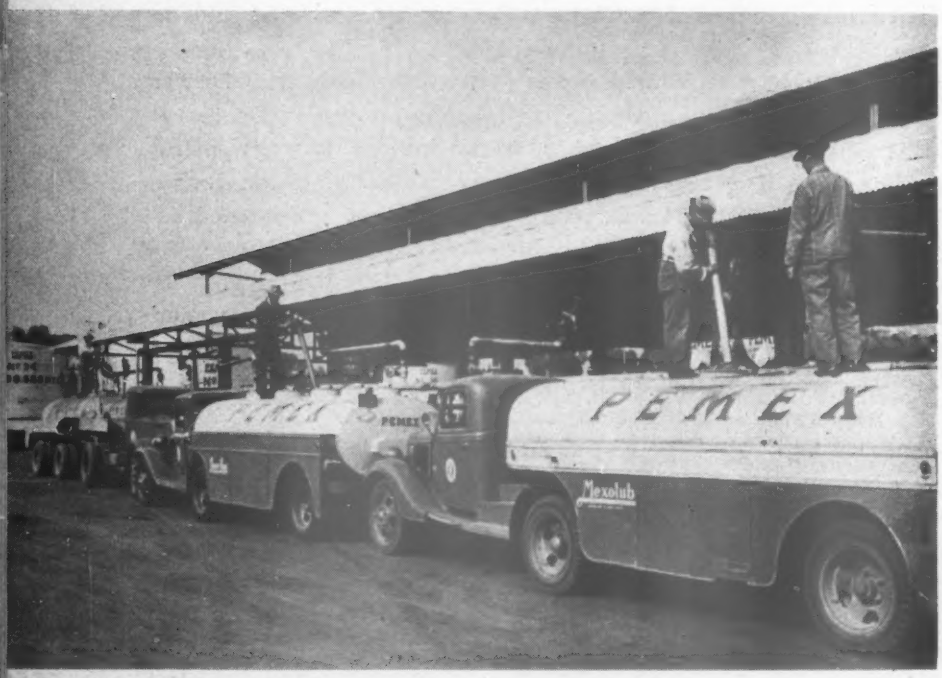
Hopes of the industry to obtain priorities for the purchase of certain equipment apparently constitute no secret. The thorough-going inspection of the Mexican oil fields and refineries by the DeGolyer commission in August and September of 1942 paved the way for these hopes. Recent extended talks in the United States by General Manager Efrain Buenrostro and other officials of Petroleos Mexicanos (Pemex), looking toward the acquisition of urgently needed machinery, came as a sort of follow through of the DeGolyer recommendations.

What those recommendations are has not been disclosed officially. But it is well known that the DeGolyer commission came to Mexico to ascertain essential needs of the industry and report back to the U. S. War Production Board.

Officially unconfirmed rumors here are that Pemex is to be granted priorities for the purchase of equipment for a 100-octane gasoline plant; for a paraffin plant and a lubricating-oil plant. It is further rumored that about 30 drilling rigs for new exploration are to be made available.

Recently one of the Mexico City newspapers reported it was understood General Manager Buenrostro during his visit to the United States had completed arrangements for importing machinery and equipment for increased use of gas from the Poza Rica region; for increasing the capacity of the pipe line from Poza Rica to the big Atzcapotzalco refinery in Mexico City and for producing 100-octane gasoline.

*Loading dock in Mexico City refinery of Pemex*




### Another Line Considered

There has been considerable talk of constructing another pipe line from Poza Rica to the Atzcapotzalco refinery and of improving existing pump stations.

It seems reasonable to assume that if aid is granted to the Mexican industry it will be of the sort cited. Pemex's most urgent needs at this time, taking into consideration the war's limitation of exports, are improved refinery facilities and the discovery of new producing areas.

The latter need—new sources of supply—is for the time being a secondary one because Mexico's potential daily production of crude, conservatively placed at 152,000 bbl., is in excess of domestic and export demands. During the 5 years of gov-

ernmental operation, however, Pemex has opened no new fields. It is quite true that new production in producing fields, in proven territory and in the expansion of such territory, has been developed. But no new oil deposits have been uncovered.

In the face of increasing domestic requirements and the potentialities of higher exports after the war, production is a phase of the industry that before long may demand much more intensive development if production is to keep safely ahead of demand.

The need of improved refinery facilities is perhaps paramount at this particular period, for the industry is now most seriously concerned with increasing the volume and octane content of its gasoline, and with increasing its output of fuel and lubricating oils. Dependent now in a major

*JESUS M. DE LA GARZA*

way upon domestic demand—the average daily exports are running only about 16,000 bbl.—the industry is sorely in need of refinery rehabilitation. For 5 years, or since expropriation on March 18, 1938, these plants have been operated with only makeshift repairs.

It is considered likely that the general policy of the United States to aid as far as possible in maintaining the economic stability of Latin-American nations will perhaps exert the most dominant influence in such steps as may be taken to assist the Mexican industry. Despite the Cooke-Zevada award of 1942 in which the sum of $23,995,991 was fixed as compensation for the five American interests affected by expropriation, the American companies, so far as any official announcement is concerned, have not indicated that they consider the matter closed. In the case of the Mexican-Eagle (Shell), the British company, no fixed compensation has been arrived at.

It was in the wake of the Cooke-Zevada award that the DeGolyer commission surveyed the Mexican fields and refineries. The fact that such a survey was made was interpreted in some quarters as pointing toward possible aid to the industry.

### Halt of Disruptions Sought

The basic thought behind any such assistance logically would be to grant material and equipment necessary to prevent any serious disruption of the industry, observers who have kept in touch with the situation opine. The supplying of caustic soda and other strategic materials needed in refining, which has been going on now for some time, is an illustration of this policy, it was added.

Another angle that doubtless is being considered is the development of a higher-octane gasoline in Mexico, particularly for aviation needs. It is necessary now to move airplane gasoline from the United States to Mexico. Any lessening of this movement would release additional aviation gasoline for use in the states and would save critical transportation.

Mexican gasoline is now, generally speaking, of low octane. The general run of the refineries is about 42 octane without lead. This is raised to 57 octane by addition of ethyl fluid. In addition Pemex has been bringing in some high-octane gasoline from the states. Mexolina, the best grade of Pemex motor fuel, runs as high as 70 octane.

Internal distribution of its products is not considered a matter of undue difficulty by Pemex, provided railway facilities are kept at an efficient average. There has been complaint from industry in various regions over shortage of petroleum products but this, Pemex alleges, is due to inability at times to get proper rail movement of tank cars. This is generally considered a railway problem rather than one of the oil industry.

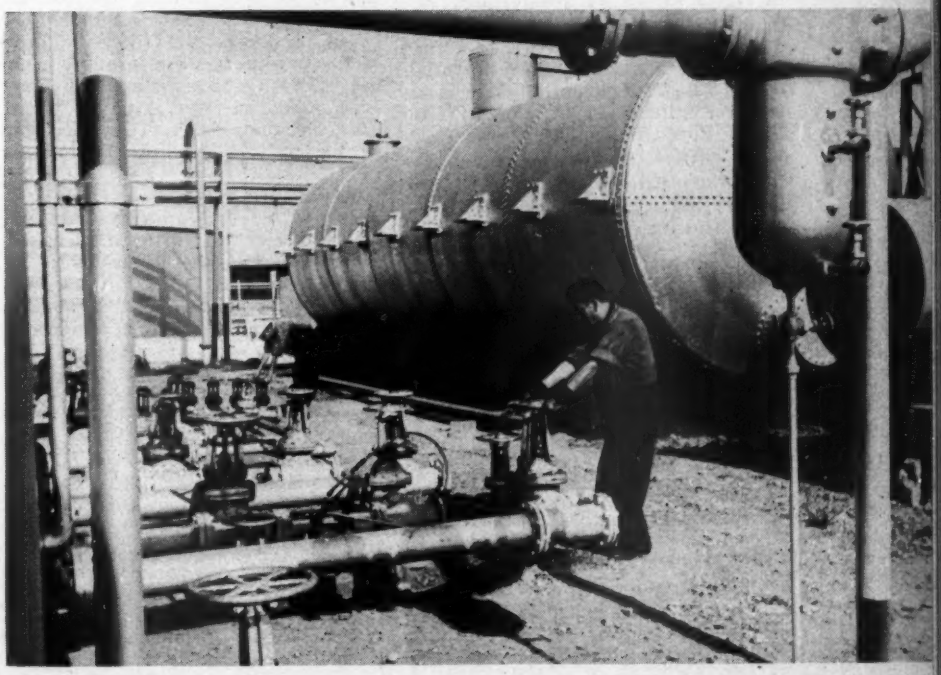
As for new production requirements, the industry is not considered by many observers as being in any particularly dire need of new rigs. Sufficient rigs are reported available for putting down new wells in the existing producing areas. The search for new fields, however, is considered, as mentioned, a matter of much importance against the future.

### Assistance Pledged

Lending some significance to the object of General Manager Buenrostro's visit to the United States are reports published since that visit got under way. The United States assistant petroleum administrator has been quoted to the effect that everything possible would be done to aid Pemex in obtaining the necessary equipment for producing high-octane gasoline. Harold Ickes has been quoted as saying that the importance of Mexican production for strategic and other reasons is fully recognized.

Through restriction of exports by the war's curtailment of markets, Mexico has been forced to concentrate on its domestic market. During 1937, final year of private operation

*Manifold system in Mexico City refinery of Pemex*



of the industry, domestic consumption of gasoline totaled 8,000 bbl. daily. This jumped to 10,675 bbl. for 1940 and to 12,225 bbl. for 1941, or a 14.5 per cent increase.

Estimates are that Mexico has been importing about 6,000 bbl. daily of gasoline, lube, kerosene, fuel oil and other products from the United States. Some of this has come from points just across the border, some reportedly from Houston.

The volume of daily refinery runs is, in the absence of official figures, largely a question of estimate. In 1942, crude production for the country was 35,000,000 bbl. Of this, crude exports totaled some 3,000,000 bbl., leaving 32,000,000 bbl. for refinery runs.

There was a considerable drop in storage stocks from August 1942 to February 1943, or from 16,100,000 to 13,400,000 bbl., and this may have boosted the 1942 refinery runs above the 32,000,000-bbl. estimate. On the basis of that figure the refinery runs would be shown as around 90,000 bbl. of crude daily for 1942.

### Gasoline Production Declines

Gasoline output has shown a marked drop from the recovery registered in 1937. The output in 1937 was 7,250,000 bbl., or a 19 per cent recovery on the crude runs. The same plants in 1941 produced about 4,100,000 bbl., a 13 per cent recovery on crude.

In contrast with this decrease in the volume of recovery, the domestic market for gasoline has shown a regular increase of about 12 per cent annually.

It is this situation that magnifies the need of Pemex for refinery rehabilitation.

Current crude production of 80,000 bbl. daily compares with a potential of 152,000. This potential yield is as follows: Isthmus, 12,000; North fields, 20,000; South fields, 20,000; and Poza Rica, 100,000 bbl. daily.

Average daily yield for the year and the high point of production registered during the year are given for the past 6 years as follows:

In 1937, highest daily yield, 143,000 bbl.; average for year, 128,000 bbl. daily.

In 1938, highest, 110,000; average, 105,000.

In 1939, highest, 150,000; average, 117,000.

In 1940, highest, 152,000; average, 120,000.

In 1941, highest, 144,000; average, 117,000.

In 1942, highest, 141,000; average, 95,000.

In 1943, average, 80,000 bbl.

The gradual drop in exports as compared with 6 years ago is shown by the following figures, giving the high point in daily exports and the average daily exports for the year, including crude and products:

*CARLOS L. CORCUERA*

In 1937, 63,000 bbl. daily average.

In 1938, highest daily average, 51,000 bbl.; average for the year, 33,000 bbl.

In 1939, highest, 78,000; average, 49,000.

In 1940, highest, 65,000; average, 55,000.

In 1941, highest, 54,000; average, 43,000.

In 1942, highest, 43,000; average, 17,000.

In 1943, average daily, 16,000 bbl.

### Scope of Drilling

New production in 1942 and operations now under way give a fair picture of Pemex's drilling program. In 1942, 15 wells were completed, 4 being producers, 11 failures. Three of the producers were brought in in the known producing area of Poza Rica, and each was good for about 3,000 bbl. daily flush. The other was in the proven area of the Panuco field.

So far during 1943, three wells have been completed, two being producers. One producer was in Poza Rica, the other well and the failure were in the Panuco field.

Nine wells are now drilling. One is a wildcat in the State of Guerrero. At 2,500 ft., while fishing for pipe, the drill stem was lost. Another wildcat, west of Dos Bocas, is drilling at San Diego in the State of Veracruz. This operation went to 6,500 ft. with only 800 ft. of casing. The hole collapsed, was deflected at 4,800 ft., and is now drilling at 5,000.

The third wildcat is in the Isthmus. It was spudded June 30, 1941, lost the tools at 5,000 ft. and is now shut down.

The other six operations now under way are divided three each between Poza Rica and the Isthmus fields.

Drilling operations during 1939 accounted for 22 wells. Sixteen were producers, six failures. During most of 1939, 1940 and 1941, Pemex drilled on locations that had already been made by the expropriated companies.

During 1940, 20 wells were drilled, 16 being producers, 4 failures.

The record for 1941 was 23 wells, 14 being producers.

Of the 1942 drilling program, two operations were wildcats put down in an unsuccessful effort to extend the Golden Lane to the south. Two gas wells were also completed in 1942 in northern Mexico by private national interests.

### Key Men in Pemex

Key men in the industry assisting General Manager Buenrostro are Lic. Manuel Sanchez Cuen, assistant general manager; Ing. Jesus M. de la Garza, production manager; Ing. Carlos L. Corcuera, refinery manager; Manuel G. Leiva, domestic sales manager, and Carlos Raynoso, export sales manager.

Refinery Manager Corcuera, formerly with the Mexican Eagle, is a graduate in chemical engineering from the University of Oxford. Thirty-seven years old, he has visited frequently in the United States.

Domestic Sales Manager Leiva, also 37, was educated in Mexico at the old School of Commerce that is now part of the National University. He was with the Huasteca company in Mexico from 1925 until expropriation.

Messrs. Raynoso and Corcuera accompanied General Manager Buenrostro during the conferences in the United States.

In his report on the state of the industry, issued the past March on the anniversary of the expropriation, General Manager Buenrostro cited in detail the difficulties encountered in the refinery phase of the industry. These difficulties, so far as equipment was concerned, were met by the manufacture of parts in the country, importation of some materials and the use of substitutes improvised in Pemex shops, he added.

He set forth that with assistance from the United States in the matter of priorities for equipment, the industry proposed to carry on greater exploration work in the field. "For 1943," he added, "we plan 54 wells in proven and new territory—west of Faja de Oro, Chicontepec, and south of Poza Rica to the eastern Sierra Madre; and in Tabasco, along the Pacific Coast, in Baja California, Sonora and Sinaloa, and the northwest, Nuevo Leon and Tamaulipas."

Mr. Buenrostro said plans for the Mexican industry include increased gasoline production for special distribution in the Federal District, greater pipe-line capacity and more tank cars for internal distribution.

# Text of P-98-b Amended

THE fulfillment of requirements for the defense of the United States has created a shortage in the supply of critical materials for defense, for private account and for export; and the following order is deemed necessary and appropriate in the public interest and to promote the national defense:

Section 1041.2. Preference Rating Order P-98-b.

## Purpose and Scope

**(a) Purpose.**

The purpose of this order is to make available methods by which an operator may acquire deliveries of material for essential production and construction operations as well as for maintenance or repair purposes or as operating supplies. This order also applies to the use of material in certain construction operations and establishes uniform standards by which operators in the petroleum industry may obtain and use their necessary material requirements for the effective continuance of necessary petroleum industry operations.

From time to time supplementary orders or directions will be issued to operators covering the use of allotment numbers, symbols or preference ratings or the delivery or use of material and informing them of modifications in the programs and policies of the War Production Board or the Petroleum Administration for War.

**(b) Definitions.**

1. "Person" means any individual, partnership, association, business trust, corporation, governmental corporation or agency, or any organized group of persons, whether incorporated or not.

2. "Operator" means:

(i) any person located in the United States, its territories or possessions to the extent that he is engaged in the petroleum industry (Domestic operator); or

(ii) any person located in the Dominion of Canada to the extent that he is engaged in the petroleum industry and to whom and in whose name a copy of this order or of Preference Rating Order P-98, Extended and Amended, is or has been specifically issued and to whom a serial number has been assigned (Canadian operator).

3. "Supplier" means any person with whom a delivery order is placed for delivery of material to an operator or to another supplier.

4. "Petroleum" means petroleum, petroleum products and associated hydrocarbons including but not limited to natural gas.

5. Except as provided in Schedule B hereof, "Petroleum Industry" means any operation directly incident to:

(i) the discovery, development or depletion of petroleum pools (production);

(ii) the extraction or recovery of natural gasoline and associated hydrocarbons (natural gasoline production);

(iii) the transportation, movement, loading or unloading of petroleum other than natural gas (transportation);

(iv) the processing, refining, or compounding of finished or unfinished petroleum products (refining).

(v) the distribution or dispensing of petroleum products (other than natural gas) and the storing of petroleum products incident thereto (marketing);

and shall include for each of the above listed branches of the industry, to the extent applicable therein, the investigation into more efficient or more effective methods of conducting petroleum industry operations by means of research or technical laboratories.

6. "Material" means any commodity, equipment, accessory, part, assembly, or product of any kind.

7. "Production operation" means any use of material for construction, expansion, improvement, reconstruction, remodeling, alteration, maintenance, repair, or replacement incident to production.

8. "Construction operation" means any use of material for construction, expansion, improvement, reconstruction, remodeling, alteration, maintenance, repair, or replacement incident to natural gasoline production, transportation, refining or marketing.

9. "Maintenance or repair" means that use of material specified in Schedule A hereof.

10. "Operating supplies" means any material (other than material used for maintenance or repair purposes) which is essential to and consumed in the petroleum industry and which is normally carried by an operator as operating supplies or which is normally chargeable to operating expense.

11. "Controlled material," "Class A Product" and "Class B Product" shall have the same meanings, respectively, as in CMP Regulation 1 of the War Production Board.

12. "Allotment" means a determination by the Petroleum Administration for War or a further determination by any operator or secondary consumer as to the portion of its allotment of controlled materials which may be received by an operator or a secondary consumer, as the case may be.

13. "Delivery order" means any purchase order, contract, release or shipping instruction which constitutes a definite and complete instruction from a purchaser to a seller calling for delivery of any material or product. The term does not include any contract, purchase order, or other arrangement which, although specifying the total amount to be delivered, contemplates that further instructions are to be given.

14. "Authorized controlled material order" means any delivery order for any controlled material as such (as distinct from a product containing controlled material) which is placed pursuant to an allotment as provided in paragraph (j) of this order or which is specifically designated to be such by any regulation or order of the Petroleum Administration for War or the War Production Board.

**(c) Restrictions on scope of order.**

1. No operator may use an allotment number or symbol or apply a preference rating to secure delivery of any material which may be acquired under this order other than in accordance with the applicable provisions of this order; provided, however, that an operator who, but for the terms of this subparagraph, would be required by Priorities Regulation 9 to utilize the method provided in that regulation to obtain priorities assistance for export, shall continue to obtain priorities assistance in the manner provided by Priorities Regulation 9, as amended from time to time.

2. No operator, other than as specifically provided for in Schedule C hereof, may apply a preference rating to obtain delivery of any of the material specified in that schedule.

3. Any allotment number or symbol issued or any preference rating assigned to any operator prior to May 15, 1943, shall not be considered revoked by the provisions of subparagraph (1) of this paragraph (c).

## MRO Materials

**(d) Method of securing MRO material.**

1. To secure delivery of material for maintenance or repair purposes or as operating supplies—including without limitation controlled materials, Class A, or Class B products—an operator is hereby authorized to use allotment symbol MRO-P-98-b and a preference rating of AA-1. Material delivered or to be delivered for maintenance or repair purposes or as operating supplies is referred to as "MRO material."

2. In placing an allotment symbol and preference rating on a delivery order for MRO material, the operator shall endorse upon such delivery order the certification provided in paragraph (l).

3. Any operator requiring aluminum (in any of the forms or shapes constituting a controlled material) as essential MRO material, where the use of other material for this purpose is impracticable, may obtain such aluminum from a controlled materials producer or from an approved aluminum warehouse in amounts of not to exceed 100 lb. from all sources during any one calendar quarter, only by endorsing upon any delivery order the certification provided in paragraph (l).

Any operator requiring aluminum as essential MRO material (in any of the forms or shapes constituting a controlled material) in amounts in excess of 100 lb. from all sources during any one calendar quarter, where the use of other material for this purpose is impracticable, may apply for an allotment of the amount thereof in excess of 100 lb. during any one calendar quarter by letter addressed to the Aluminum and Magnesium Division, War Production Board, Washington, D. C., Ref.: MRO. Such letter should contain substantially the information called for by subparagraphs (d) (1) to (d) (6) of Supplementary Order M-1-l, as amended March 10, 1943. Such orerator may place authorized controlled material orders, based on any allotment received pursuant to such application, with a controlled materials producer or an approved aluminum warehouse only by using the certification provided in paragraph (l).

4. Prior to placing with a supplier a delivery order for MRO material bearing the certification provided in paragraph (l), each operator shall submit copies of delivery orders to the Petroleum Administration for War or the Office of Oil Controller, as follows:

(i) Where Schedule D is applicable, submission shall be made in the manner and to the places specified therein. If Schedule D is not applicable:

(ii) Where the total cost to the operator of all items on the delivery order is $100 or more, but less than $1,000, and the cost of every item on the delivery order is less than $500, one copy of such delivery order shall be submitted.

(iii) Where the total cost to the operator of all items on the delivery order is $1,000 or more and the cost of every item on the delivery order is less than $500, two copies of such delivery order shall be submitted.

(iv) Where the cost to the operator of any item on the delivery order is $500 or more, two copies of such delivery order shall be submitted.

No delivery order need be submitted by an operator where the total cost to the operator of all items on the delivery order is less than $100.

When the delivery order is for MRO material to be used in production, a domestic operator shall submit such delivery order to the district office of the Petroleum Administration for War in the district where the material is to be used. When the delivery order is for MRO material to be used in any other branch of the industry, a domestic operator shall submit such delivery order: (a) to a district office of the Petroleum Administration for War (in the district in which the material will be used or in which the purchasing office of the operator is located, as the operator may elect) where such delivery order is to be submitted in accordance with subparagraphs (d) (4) (ii) or (d) (4) (iii); or (b) to the Washington office of the Petroleum Administration for War where such delivery order is to be submitted in accordance with subparagraph (d) (4) (iv). A Canadian operator shall, in every instance, submit such delivery order to the Office of Oil Controller of the Dominion of Canada.

Each such delivery order submitted to the Petroleum Administration for War or the Office of Oil Controller shall have endorsed upon it or be accompanied by a statement identifying the specific use to which the material is to be put, the branch

of the petroleum industry and the PAW district in which the material is to be used, the price, quantity and description of the material on the delivery order (including weight if a controlled material), and, where applicable, such additional information as may be necessary to enable the proper official to make an accurate determination of the operator's needs.

5. No operator may place with a supplier any delivery order submitted in accordance with subparagraph (d) (4) (iii) or (d) (4) (iv) until approval has been received from the Petroleum Administration for War or the Office of Oil Controller.

6. In placing a delivery order bearing an allotment symbol or preference rating, no operator shall alter the customary designation of any item or subdivide an ordinary purchase of any item or items for the purpose of making it appear that an item costs less than $500; that the total cost of all items on the delivery order is less than $1,000; or that the total cost of all items on the delivery order is less than $100.

**(e) Emergency provisions for securing MRO material.**

1. If there has been an actual breakdown or suspension of operations and if the method specified in paragraph (d) for using the allotment symbol, preference rating or certification will not permit an operator to obtain MRO material on the date and in the quantity required, the operator may request authority to obtain delivery of such material by communicating by letter, telegram or telephone with the Petroleum Administration for War, Washington, D. C., Ref.: P-98-b, supplying the following information:

(i) Date of actual breakdown or suspension of operations and exact explanation as to what extent operations are affected.

(ii) Description of equipment to be repaired and its function in maintaining continuous operation.

(iii) Price, quantity, and detailed description of necessary material (including weight if a controlled material) and number and date of delivery order(s) therefor.

Whenever any of the above information is furnished by telephone, the operator shall confirm such information within 3 days by a letter or telegram.

No delivery order for MRO material for emergencies need be submitted.

2. No operator may place with a supplier a delivery order, covering the delivery of material for which approval has been requested pursuant to subparagraph (e) (1), until approval has been received from the Petroleum Administration for War or the War Production Board. In placing any such delivery order after receipt of approval, the operator shall use the certification provided in paragraph (l).

## Material for Production Operations

**(f) Method of securing material for production operations.**

1. Any domestic operator, who during the year 1942 drilled 40,000 ft. of hole or more, may apply for authority to obtain delivery of any material (other than MRO material) requiring the use of an allotment number or preference rating, which material is for a production operation, only by submitting to the district office of the Petroleum Administration for War in the district where the material is to be used Form PD-873 at least 4 months prior to the calendar quarter in which such material is to be delivered. Notwithstanding this provision, any such operator may request interim assistance to obtain additional quantities of material for a production operation, or any domestic operator who during the year 1942 drilled less than 40,000 ft. of hole, may apply for authority to obtain delivery of any material (other than MRO material) requiring the use of an allotment number or preference rating for a production operation, only by submitting to the district office of the Petroleum Administration for War in the district where the material is to be used Form PD-873 not less than 1 month prior to the time the operator proposes to initiate or to obtain delivery of material for such production operation.

2. Any Canadian operator may apply for authority to obtain delivery of any material (other than MRO material) requiring the use of an allotment number or preference rating, which material is for a production operation, only by submitting to the Office of Oil Controller of the Dominion of Canada Form PD-873 not less than 1 month prior to the time the operator proposes to initiate or to obtain delivery of material for such production operation.

3. Submission of Form PD-873 to the Petroleum Administration for War or the Office of Oil Controller shall constitute an application for an allotment of controlled materials, an application for an allotment number and preference rating, and, subject to the applicable provisions of Petroleum Administrative Order 11, as amended and supplemented from time to time, an application for authority to use an allotment number and preference rating to secure delivery of material necessary for the production operation(s) specified on such form. The Petroleum Administration for War or the Office of Oil Controller may thereafter make an allotment and authorize the use of an allotment number and preference rating to secure delivery of material necessary for the production operation(s) specified on such form. Such allotment and authorization will be made on Form PD-873.

4. In the event that authority to use an allotment number and preference rating is granted to the operator, the operator may use such allotment number and preference rating by placing them upon the delivery order for material to be used in the production operation(s) specified on Form PD-873 and by certifying the delivery order as provided in paragraph (l).

5. Prior to placing with a supplier a delivery order bearing an allotment number and preference rating for the delivery of any material (other than MRO material or controlled materials) to be used in a production operation, each operator shall submit copies of delivery orders to the Petroleum Administration for War or the Office of Oil Controller, as follows:

(i) Where the total cost to the operator of all items on the delivery order is $100 or more, but less than $1,000, and the cost of every item on the delivery order is less than $500, one copy of such delivery order shall be submitted.

(ii) Where the total cost to the operator of all items on the delivery order is $1,000 or more or where the cost to the operator of any item on the delivery order is $500 or more, two copies of such delivery order shall be submitted.

No delivery order need be submitted by an operator where the total cost to the operator of all items on the delivery order is less than $100.

A domestic operator shall submit such delivery order to the district office of the Petroleum Administration for War in the district where the material is to be used. A Canadian operator shall submit such delivery order to the Office of Oil Controller of the Dominion of Canada.

Each such delivery order submitted to the Petroleum Administration for War or the Office of Oil Controller shall have endorsed upon it or be accompanied by a statement identifying the serial number of the Form PD-873 which was returned to him as authority to acquire the material, the specific use to which the material is to be put, and the price, quantity and description of material on the delivery order.

6. No operator may place with a supplier any delivery order submitted in accordance with subparagraph (f) (5) (ii) until approval has been received from the Petroleum Administrator for War or the Office of Oil Controller.

7. In placing a delivery order bearing an allotment number and preference rating for material (other than controlled material) to be used in a production operation, no operator shall alter the customary designation of any item or subdivide an ordinary purchase of any item or items for the purpose of making it appear that an item costs less than $500; the total cost of all items on the delivery order is less than $1,000; or the total cost of all items on the delivery order is less than $100.

## Material for Construction Operations

**(g) Authorization required for certain construction operations.**

No operator may accept delivery of, acquire, or use material in a construction operation except as specified in Schedule E hereof.

**(h) Method of securing material for construction operations.**

1. Any domestic operator may apply for authority to obtain delivery of material (other than MRO material) requiring the use of an allotment number or preference rating, which material is for a construction operation, only by submitting to the Petroleum Administration for War those forms at such times as may be specified in Schedule E hereof. Any Canadian operator may apply for authority to obtain delivery of material (other than MRO material) requiring the use of an allotment number or preference rating, which material is for a construction operation, only by submitting to the Office of Oil Controller of the Dominion of Canada those forms at such times as may be specified in Schedule E hereof.

2. Submission of the proper form for a specific construction operation as specified in Schedule E hereof shall constitute an application for an allotment of controlled materials, an application for an allotment number and preference rating, an application for authority to use an allotment number and preference rating, and, subject to the applicable provisions of Schedule E hereof, an application for authorization to accept delivery of or acquire material and to initiate the construction operation(s) specified in the form submitted. The Petroleum Administration for War, the Office of Oil Controller, or the War Production Board may thereafter make an allotment and authorize the use of an allotment number and preference rating to secure delivery of material necessary for the construction operation(s) specified in or authorized pursuant to an application submitted in accordance with Schedule E hereof.

3. In the event that authority to use an allotment number and preference rating is granted to the operator, the operator may use such allotment number and preference rating by placing them upon the delivery order for material to be used in the specified construction operation(s) and by certifying the delivery order as provided in paragraph (l).

4. Preference ratings assigned to construction operation(s) may be applied or extended only for the purpose of acquiring those items of material specifically approved in connection with the construction operation(s) specified in or authorized pursuant to an application submitted in accordance with Schedule E hereof; and authorized controlled material orders may be placed only for the purpose of acquiring those items of controlled material specified for use in the construction operation(s).

5. Any application upon the required form specified in Schedule E hereof for a construction operation located in the United States, its territories or possessions shall be submitted to the Petroleum Administration for War, Washington, D. C., or to such other place as may be specifically designated in Schedule E hereof. Any such application for a construction operation located in the Dominion of Canada shall be submitted to the Office of Oil Controller of the Dominion of Canada.

## Allotments, Placement of Orders

**(i) Allotments in production or construction operations.**

In certain instances an operator, who has obtained the necessary allotment of controlled materials for a production or construction operation, may require the manufacture and installation of certain Class A products or may undertake the construction

operation through a construction contractor. In either case it may be necessary for the operator to allot a portion of his allotment to the Class A product manufacturer or to the contractor (each of whom then becomes a secondary consumer) for reallotment or the placement of controlled material orders. Any operator making such an allotment shall follow the procedures established therefor in CMP Regulation 1, except as otherwise modified by this order. A secondary consumer who receives any such allotment shall not be bound by the provisions of this order and must rely upon existing procedures other than those established by this order in securing necessary material.

**(j) Placement of delivery orders; application of preference ratings.**

1. An operator who has complied with the provisions of paragraph (d), (e), (f) or (h) of this order may place a delivery order with any supplier for delivery of material authorized pursuant to such paragraph and may place upon such delivery order the allotment number or symbol and preference rating which have been duly authorized in accordance with the provisions of this order.

2. Any delivery order rated under this order shall be identified by placing thereon the allotment number or symbol authorized pursuant to the provisions of this order. Any delivery order rated pursuant to this order and bearing the certification provided for in this order shall have the same status as an order bearing an allotment number or symbol and preference rating under CMP Regulation 3. The allotment symbol MRO-P-98-b shall constitute an allotment symbol for the purpose of CMP Regulation 3.

3. Any delivery order for controlled materials placed pursuant to this order and bearing the certification provided for in this order shall constitute an authorized controlled material order; provided, that such delivery order must be in sufficient detail to permit entry on mill schedules and must be received by the controlled materials producer at such time in advance as is specified in Schedule 3 of CMP Regulation 1, or at such later time as the controlled materials producer may find it practicable to accept the same.

4. The allotment number referred to in this paragraph (j) or endorsed upon any delivery order bearing the certification provided for in this order shall be the abbreviated allotment number prescribed by subparagraph (c) (6) (ii) of CMP Regulation 1, including as the last two digits, the number of the month in which delivery is requested in place of the number identifying the quarter for which the allotment received is valid.

**(k) Use, cancellation or reduction of allotments.**

1. When an allotment received by an operator is not reallotted, or authorized controlled material orders therefor are not placed, within 30 days of receiving the allotment, the operator shall promptly notify the Petroleum Administration for War in Washington, D. C., or the Office of Oil Controller in Toronto, Canada, of this fact and of the extent to which the allotment has not been reallotted or authorized controlled material orders therefor have not been placed. In the event that an operator elects not to use an allotment which has been received by him, he shall, within 30 days of receiving the allotment, notify the Petroleum Administration for War in Washington, D. C., or the Office of Oil Controller in Toronto, Canada, of this fact and of the extent to which he has elected not to use the allotment, together with the reasons therefor.

2. An operator who has made an allotment may cancel or reduce the same by notice in writing to the person to whom it was made. Where an allotment received by an operator is cancelled, he must cancel all allotments which he has made and all authorized controlled material orders which he has placed, on the basis of the allotment; and where an allotment received by an operator is reduced, he must cancel or reduce allotments which he has made, or authorized controlled material orders which he has placed, to the extent that the same exceed his allotment as reduced. In the event that this course of action is impracticable, the operator shall immediately report to the Petroleum Administration for War or the Office of Oil Controller for instructions.

**(l) Certification.**

An operator may use any allotment number or symbol or preference rating authorized pursuant to this order only by endorsing upon his delivery order a certification in substantially the following form, signed manually or as provided in Priorities Regulation 7:

The undersigned purchaser certifies, subject to the penalties of Section 35A of the United States Criminal Code, to the seller and to the War Production Board, that, to the best of his knowledge and belief, the undersigned is authorized under applicable War Production Board regulations or orders to place this delivery order, to receive the item(s) ordered for the purpose for which ordered, and to use any preference rating or allotment number or symbol which the undersigned has placed on this order.

This certification may be used in lieu of any other certification required by any CMP regulation to be endorsed on a delivery order or to be furnished therewith. Any certification provided for in this order, so used, shall be construed to be a representation of facts in the same manner and to the same extent as any specific certification required by any CMP regulation.

**(m) Restoration of inventories.**

An operator may, subject to the provisions of this order, use the allotment number or symbol and the preference rating duly authorized in accordance with the provisions of this order to restore to a practical working minimum his inventory of material where the inventory has been depleted through use of MRO material or material necessary to a production or construction operation; provided, that no delivery of material which would result in surplus material, as defined in Preference Rating Order P-98-c, may be accepted by any operator.

**(n) Restrictions.**

No operator may use the allotment number or symbol or the preference rating duly authorized in accordance with the provisions of this order:

1. To obtain delivery of material in greater amounts or on earlier dates than required to fulfill the purpose authorized pursuant to the provisions of this order.

2. To obtain delivery of material for any purpose other than a purpose authorized pursuant to the provisions of this order.

3. To obtain delivery of material which can be secured without the use of an allotment number or symbol or preference rating.

4. To obtain delivery of material the use of which could be eliminated without serious loss of efficiency by substitution of less scarce material, or by change of design.

5. To obtain delivery of material in such amounts or at such dates that receipt of such amounts on the requested dates would result in surplus material, as defined in Preference Rating Order P-98-c.

6. To obtain delivery of material unless such operator is on or after June 1, 1943, a participant in the PAW Materials Redistribution Program 2, in the event that participation by the operator in such program is required by the terms of the program.

**(o) Applicability of other orders and regulations.**

1. This order and all transactions affected hereby, except as herein otherwise provided, are subject to all applicable orders or regulations of the War Production Board, as amended from time to time.

2. None of the provisions of CMP Regulations 2, 5, or 6 (or the limitations incorporated in any CMP regulation which otherwise would subject an operator to the provisions of CMP Regulations 2, 5, or 6) shall apply to an operator and no operator shall obtain any material under or be limited by the provisions of such regulations or limitations. The provisions of paragraphs (i), (s), (s-1) and (u) of CMP Regulation 1 shall not apply to an operator who secures delivery of material in accordance with the provisions of this order and no such operator shall to this extent be limited by the provisions of these paragraphs of CMP Regulation 1. None of the provisions of Limitation Order D-41, as amended from time to time, shall apply to an operator as such operator is limited by the provisions of such order.

**(p) Communications.**

All reports which may be required to be filed hereunder and all communications concerning this order shall, unless otherwise directed, be addressed:

1. By any person located in the United States, its territories or possessions to: Petroleum Administration for War, Interior Building, Washington, D. C., Ref.: P-98-b.

2. By any person located in the Dominion of Canada to: Office of Oil Controller, Dominion of Canada, Toronto, Canada, Ref.: P-98-b.

Wherever communications are specifically directed to be addressed to a district office of the Petroleum Administration for War such communications shall be addressed to the district office for the appropriate area as specified in Schedule F hereof.

**(q) Violations.**

Any person who wilfully violates any provision of this order or who wilfully furnishes false information to the Petroleum Administration for War or the War Production Board in connection with this order is guilty of a crime and upon conviction may be punished by fine or imprisonment. In addition, any such person may be prohibited from making or obtaining further deliveries of or from processing or using material under priority control and may be deprived of priorities assistance by the War Production Board.

Issued this fifteenth day of May, 1943.

War Production Board.

By J. Joseph Whelan, recording secretary.

## Schedule A

"Maintenance or repair" means, without regard to accounting practice, any use of material:

1. In production, natural-gasoline production, transportation or refining for any of the following purposes:

(i) the upkeep of material or equipment in a sound working condition;

(ii) the restoration of material or equipment which has been rendered unsafe or unfit for service by wear and tear, damage, destruction, failure of parts or similar causes; or

(iii) any other production or construction operation not exceeding in material cost $500 for any one complete operation which has not been subdivided for the purpose of coming within this definition:

Provided, that upkeep or restoration shall not include any use of material for the improvement of material or equipment by the replacement of material which is still serviceable in the existing material or equipment; and provided further, that maintenance or repair shall not include the installation or replacement of pumping or other artificial lifting equipment or the deepening or plugging back of any well.

2. In marketing for any of the following purposes:

(i) the upkeep of any structure or equipment in a sound working condition;

(ii) the restoration of any structure or equipment or part thereof to a sound working condition when such structure or equipment or part thereof has been rendered unsafe or unfit for further service by wear

or tear, damage, destruction, failure of parts or similar causes; or

(iii) any other construction operation in connection with any bulk plant (but not any service station or retail outlet) not exceeding in material cost $500 for any one complete operation which has not been subdivided for the purpose of coming within this definition:

Provided, that upkeep or restoration shall not include any use of material for the improvement of any structure or equipment by the replacement of material which is still serviceable in the existing structure or equipment; and provided further, that maintenance or repair shall not include any construction operation in connection with a service station or retail outlet other than for upkeep or restoration purposes.

### Schedule B

**Nonpetroleum industry uses of materials.**

Other than as specifically provided for in this schedule, use of the following material shall not be considered as a use of material in the petroleum industry:

(a) Material or equipment which is to be used by consumer accounts for or in the storage or dispensing of petroleum, including liquefied petroleum gas.

(b) Material or equipment which is to be used for transportation by means of a tank truck or trailer, railroad rolling stock, or marine equipment; provided, that:

(i) Where material is to be used on a tank truck or trailer and is specialized petroleum material or equipment which is actually to be attached to the truck or trailer and is necessary to the containing, dispensing, measuring the movement, or distributing of petroleum, such use shall be considered a use of material in the petroleum industry.

(ii) Where material is to be used on railroad rolling stock and the rolling stock is owned or leased by the operator, used on his premises and in the petroleum industry, and is not under the jurisdiction of the Interstate Commerce Commission, such use shall be considered a use of material in the petroleum industry.

(iii) Where material is to be used on marine equipment and the marine equipment is used or chartered by the operator, is used on or in the vicinity of his premises and in the petroleum industry, and is not under the jurisdiction of the U. S. Maritime Commission, the Navy Department, or any other federal agency for the purpose of establishing methods by which material incident to the operation of the marine equipment may be made available, such use shall be considered a use of material in the petroleum industry.

(c) Material or equipment which is to be used in connection with a construction operation for "residential construction" or "multiple residential construction," as defined in Limitation Order L-41, as amended from time to time.

### Schedule C

Schedule C lists material and equipment used in the petroleum industry but excluded from this amended order. The materials are mostly automotive replacement parts, certain chemicals, synthetic catalysts, clothing, containers, certain office equipment, stationary and hand tools.

### Schedule D

Because of the over-all materials situation, it has been necessary in exceptional instances to develop specialized treatment for certain types of material. In certain instances, special treatment is necessary only for the purpose of developing requirements to assure sufficient supplies to operators. Material of this character is treated in Part 1 of this schedule.

In other instances, the critical shortage of particular materials and the universal importance of such materials to the war program have required more complete control than ordinarily required by this order. Material of this character is treated in Part 2 of this schedule.

The schedule has been so arranged as to provide a flexible medium whereby as the status of important classes of material alters, particular classes can be added to or subtracted from the lists—thus adjusting the material demand and supply picture to the needs of petroleum industry operators.

Part 1—Material requiring submission of delivery order for information only.

(a) Prior to placing with a supplier a delivery order (for the MRO material specified in (b) of Part 1 of this schedule) bearing the certification provided in Paragraph 1, each operator shall submit for information purposes only (to the District Office of the Petroleum Administration for War in the district where the material is to be used or the Office of Oil Controller) one copy of any delivery order for such material unless the total cost to the operator of all items on the delivery order is less than $100.00.

No delivery order need be submitted by an operator where the total cost to the operator of all items on the delivery order is less than $100.00.

(b) Specified MRO material:

(i) Aluminum allocated pursuant to application made to the Aluminum and Magnesium Division of the War Production Board.

(ii) Rotary bits.

(c) In placing a delivery order bearing an allotment symbol or preference rating, no operator shall alter the customary designation of any item specified in Part 1, (b) of this schedule or subdivide an ordinary purchase of any item or items specified in Part 1, (b) of this schedule for the purpose of making it appear that the total cost of all items on the delivery order is less than $100.00.

Part 2—Material requiring presubmission of delivery order.

(a) Prior to placing with a supplier a delivery order (for the MRO material specified in (b) of Part 2 of this schedule) bearing the certification provided in Paragraph 1, each operator shall submit for approval two copies of any delivery order for such material where the total cost to the operator of all items on the delivery order is $100.00 or more.

No delivery order need be submitted by an operator where the total cost to the operator of all items on the delivery order is less than $100.00.

When the delivery order is for the MRO material specified in Part 2, (b) to be used in production, a domestic operator shall submit such delivery order to the District Office of the Petroleum Administration for War in the district where the material is to be used. When the delivery order is for such MRO material to be used in any other branch of the industry, a domestic operator shall submit such delivery order; (a) to a District Office of the Petroleum Administration for War (in the district in which the material will be used or in which the purchasing office of the operator is located, as the operator may elect) where the total cost of all items on the delivery order is $100.00 or more and the cost of every item on the delivery order is less than $500.00; or (b) to the Washington Office of the Petroleum Administration for War where the cost of any item on the delivery order is $500.00 or more. A Canadian operator shall, in every instance, submit such delivery order to the Office of Oil Controller of the Dominion of Canada.

Each delivery order submitted to the Petroleum Administration for War or the Office of Oil Controller shall have endorsed upon it or be accompanied by a statement identifying the specific use to which the material is to be put, the branch of the petroleum industry and the PAW district in which the material is to be used, the price, quantity and description of the material on the delivery order (including weight if a controlled material), and where applicable, such additional information as may be necessary to enable the proper official to make an accurate determination of the operator's needs.

(b) Specified MRO material:

(i) Cast iron valves over 12 in.

(ii) Industrial control instruments including relief and control valves and regulators.

(iii) Steel valves.

(c) No operator may place with a supplier a delivery order, covering the delivery of material for which approval has been requested pursuant to (a) of Part 2 of this schedule, until approval has been received from the Petroleum Administration for War.

(d) In placing a delivery order bearing an allotment symbol or preference rating, no operator shall alter the customary designation or any item specified in Part 2, (b) of this schedule or subdivide an ordinary purchase of any item or items specified in Part 2, (b) of this schedule for the purpose of making it appear that an item costs less than $500.00 or that the total cost of all items on the delivery order is less than $100.00.

(Schedule E on Page 130)

# DEATHS

**M. J. Delaney,** 77, veteran drilling contractor and oil operator of Dallas, Tex., died at his home there after an illness of several months. Mr. Delaney entered the oil business as a boy in Pennsylvania and followed the development westward. He moved to Dallas from Tulsa in 1920.

**William M. Reid,** 31, geologist for Humble Oil & Refining Co., Houston, Tex., died last week in Edmonton, Canada, where he went a month ago on loan to Imperial Oil, Ltd., of Canada to work on a military project. He was a son-in-law of W. E. Pratt and a brother-in-law of Eugene Holman, both vice presidents and directors of Standard Oil Co. (New Jersey).

**Burdette Blue,** 57, former president of Indian Territory Illuminating Oil Co., died May 17 after suffering a stroke of apoplexy while eating lunch at the Tulsa Club, in Tulsa. Mr. Blue resigned as I.T.I.O. president in August 1941, when that company was taken over by Cities Service Co. Since then he has been engaged in an advisory capacity with various Cities Service interests. At the time of his death he was president of the Kansas-Oklahoma division, Mid-Continent Oil and Gas Association. Mr. Blue went to Bartlesville, Okla., in 1906 from Kansas City. He joined I.T.I.O. the following year and rose to the position of vice president and general manager, and became president in 1935. His widow and a son survive.

**Lt. William S. Farish,** 31, son of the late president of Standard Oil Co. of New Jersey, was killed when a training plane crashed at Waxahachie, Tex., last week. The crash occurred during a flight demonstration at a war bond rally. Lieutenant Farish is survived by his wife, a son and his mother.

**Charles Edwards Woodbridge,** 75, retired treasurer of Texas Co., died May 16 at his farm home near Hope, N. J., after a week's illness.

# Economics of Water Flooding

*by Donald P. Oak**

**Although all properties can be flooded so as to yield additional oil, secondary recovery is not always economically feasible. The factors to be considered are presented in this paper which was delivered before the Mid-Continent district, A.P.I. Division of Production, at Tulsa, May 20.**

AS an engineer and operator I am constantly faced with the question of whether an operation will pay out and return a profit, and it is from this angle of practical economics that I will approach the subject of water flooding. I am sure that every petroleum engineer will agree:

1. That no oil reservoir is ever completely depleted by natural recovery methods.

2. That part of this residual oil can be recovered by some method of secondary recovery. However, the question of whether such an operation will be profitable or not is another matter and at this point practical economics enters the picture, and should be the controlling factor from that point on in every commercial operation.

The subject is not simple and there is no magic formula which will give the answer. Conditions are not static, with practically every component a variable. On the engineering side secondary recovery is still in its infancy and technique is constantly changing, so that final results will usually be considerably different from preliminary estimates, due to increased engineering knowledge while the project is being developed. On the financial side, costs are changing rapidly, chiefly due to the chaotic industrial situation. Receipts should also be changing, but from the present attitude of the authorities, I might be inclined to class the sales price of crude oil as a constant.

Other conditions, such as the tax situation which has no direct connection with an operation itself, may change a development which would be decidedly unsound for one operator, to an advantageous one for another.

With these general conditions in mind I will approach the water-flood method of secondary recovery. There are four major considerations which an operator must take into accounting in a proposed water flood. They are:

1. An oil reservoir suitable to water flooding.
2. Source and supply of water.
3. Source and supply of power.
4. Marketing facilities.

*Manager, Lynde, Walter & Darby.

Engineering and economics are so closely related in studying these factors that it is difficult not to digress into an engineering discussion. Preliminary estimates on water flooding are at best very uncertain, due to:

1. The impossibility of obtaining sufficient data on which to base an estimate without an investigation, which would practically amount to a development.

2. The changing technique in the operation of a water flood. Water flooding in the Mid-Continent field is only 10 years old and we are only beginning to get complete histories and in the meantime technique has so changed that the history of the early floods are of little value in estimating future recovery. Taking up these four factors individually, here are some thoughts for the operator in making his decision.

**1. Oil recovery:** No preliminary estimate of recovery can be accurate, even with sand analyses from core wells on every 10 or 15 acres. Experience has shown oil content and sand conditions vary greatly from location to location. Of course, the greater the density of core wells the more accurate the estimate but also the greater the investigation cost.

Another thing to keep in mind is that even with the best present technique after a property is flooded out there still remains more oil in the sand than the flood has recovered. What will the engineer be able to do about this in the future?

**2. Water source and supply:** Water source will, in the main, be either from river or deep wells, and the cost of either will vary with location. Great errors have been made in estimating quantity available. There is usually insufficient data on which to base an accurate estimate of a long-continued supply from deep wells, and the drought periods of the southwest country often interrupt river flow. Water supply failure in an active flood may cause serious loss of ultimate recovery and the cost of ob-

*Coring operations on a Kansas water flood*

taining an emergency supplemental supply is usually very high.

**3. Power source and supply.** As water flooding is mainly the reenergizing of the oil sand, power is a very important factor, and it will probably take from 6 to 10 hp. hours per barrel of oil recovered. The source of this power will be either gas engines, oil engines or electricity, depending upon which is available and cheapest. In most floods free casinghead gas is out of the picture. While there may seem to be an adequate supply before the flood is started, experience has shown that it soon disappears.

**4. Marketing facilities:** Many floods are started in old producing areas, where the pipe-line companies have restricted their capacity and are unable to take care of a large increase in production, forcing the operator to seek other outlets at large expense to himself. An operator should assure himself of an adequate outlet before starting any flood.

All of this discussion has been leading up to the central theme of costs and returns. Costs will be divided into five principal items.

**Leasehold cost:** When a water-flood site is purchased the leasehold cost is definite and easily figured, but many operators already own stripper leases which have long since paid out and whose leasehold cost, when used as a flood site, is zero. There has also been a considerable number of flood sites obtained on an overriding royalty, but it is my opinion that this practice will decrease in the future as the costs are too high. For instance, if the override is one-sixth and a recovery of 3,600 bbl. is obtained the operator has paid in the neighborhood of $900 per acre for his leasehold. Not only has he given up the 600 bbl. royalty, but he has also paid the operating expense on it, which will amount to at least another $200.

**Oil-well development:** So far the greater percentage of water floods have been located in the old shallow pools where most of the existing oil wells were in poor condition, and surface equipment was nearly worn out. The wells were also usually badly spaced to utilize as recovery wells. As it was nearly as cheap to drill a new well as to recondition an old one, most of the old wells have been plugged and abandoned and the properties redrilled with new wells and new surface equipment installed. Engineers have differed on well spacing, but the most common development has been 330 by 330 ft., which produced a density of one well to 2½ acres; others have increased this spacing up to 440 by 440 ft., or one well to 4 4/9 acres. I know only one instance where there has been a uniform spacing larger than this. The 440-ft. spacing decreases the number of wells by 25 per cent over the 330-ft. spacing, with a corresponding decrease in development cost, although this is not 25 per cent. However, there is an engineering question as to the point where decreased ultimate recovery more than offsets saving in development cost. There are two general types of production methods, pumping and flowing, and there is considerable disagreement among engineers as to the efficiency of each. Flowing has the advantage of lower investment and operating costs, while pumping gives quicker return on investment, but the big argument is difference in ultimate recovery. It is my opinion that this difference will be largely a matter of percentage, so that on high recovery floods the difference in barrels will justify the additional investment cost for pumping, while the low recovery floods, the decrease in development cost will be greater than the loss in production. Another item largely affecting the cost of development is the quality of equipment and pipe used. We are just abandoning a flood which was started in 1934, showing a life of 9 years, and if developed at present time, I am certain its life would have been 2 or 3 years more. This may not be average, but I would not want to install pipe and machinery having an anticipated life of less than 12 years. While the first cost is greater, it is better to install first quality machinery and pipe at the start, than to have to replace it half way through the life of the flood, with 80 per cent of the oil recovered.

Also, most of the operators do not develop all of their flood at one time, so that they are still developing new territory when much of their equipment and pipe on the first unit is available for use in the new development. In this case, it is imperative to install the best material available, as it will be totally worn out before the entire project is exhausted. It is also important to design and install types that are best suited to transfer. In this connection I think the electrically operated pumping unit has a very distinct advantage over the central power. After 3 or 4 years pumping when the water-oil ratio and pumping costs per barrel are high, the well can be put to flowing and unit pumper moved to a new well, while the central power must remain in operation as long as it is desirable to pump a single well. The original cost of surface equipment for a central power operating wells on 40 acres, compared with individual pumping units with transmission lines, is practically the same. In 500-ft. territory this amounted to about $360 per well 2 years ago, but with present increased costs, it would be nearer $400. It has also been found that the water produced with the oil is extremely corrosive, so that in first installation all oil lines should be protected, as they will have to be replaced in a few years if not. Transite pipe or cement-lined pipe is the most common method. Second-hand line, even of poor quality, is very satisfactory if cement lined.

Depth of the oil sand directly affects total development cost. Surface lines and tankage, of course, will be the same but drilling, casing and to some extent, pumping unit costs, increase in proportion to the depth. Drilling costs will vary with different fields, but rarely exceed $1 per foot in present developments.

Another development cost which sometimes is omitted in estimates is salt-water disposal system. All water floods will soon produce considerable quantities of water of varying salt content. In order to avoid pollution problems it is best to design a system to return the water to water plant, for treatment and recycling.

In addition to regular costs, many operators have added another initial cost in the coring and analysis of the sand on every well drilled. This work has resulted in the use of heavier shots, so that total increased cost may reach $250 per acre, but they anticipate that increased returns will more than justify increased costs.

Before discussing total development costs, I will proceed with water system development, as most operators group the two developments together in considering total costs.

**Water system costs:** The great percentage of water floods use the five-spot system, where in general there is the same number of water injection wells as oil wells. Edge development will vary this proportion slightly. All water injected into the sand must be in condition so as not to plug the sand pores, and if unprotected pipe is used, it must be noncorrosive. In all open-type systems where the water comes in contact with the air, it must be treated and filtered. Advocates of closed-type system claim they eliminate these costs, but as they still have the salt-water disposal problem on their hands, and treating costs are low, they have not as yet convinced me as to the advantage of their system. Pressures to be used are dependent on depth of sand, well density and sand permeability, and whether oil is pumped or flowed. The greater pressure used the higher the installation cost.

Again, the cost of raw water supply varies greatly. If a river supply, the cost of intake installation and pump at river and length of pipe line to plant govern, while with deep-well supply it is the cost of drilling and equipping supply wells. In eastern Kansas most supply wells will not furnish in excess of 1,500 bbl. per day apiece, while in northeastern Oklahoma their capacity is much greater. Also, in case of supply wells, some provision must be made for surplus supply while wells are being reconditioned, which is necessary pe-

riodically on account of the corrosive salt water produced. Cost per acre for a water pressure and treating plant is much less on a large project drilled by units than on a property entirely developed at one time. In the latter case, capacity must be figured for maximum demand for entire property, with resulting idle capacity in latter stages of flood, while in former, as demand decreases for first units, it is taken up in development of additional units, with pressure plant operating at capacity over a long period of time. In large projects the question of whether to use one large central plant, with large long high-pressure main water lines, with attending high-friction loss of head, or to use several smaller plants with short small main lines and low-friction loss is one which requires careful study.

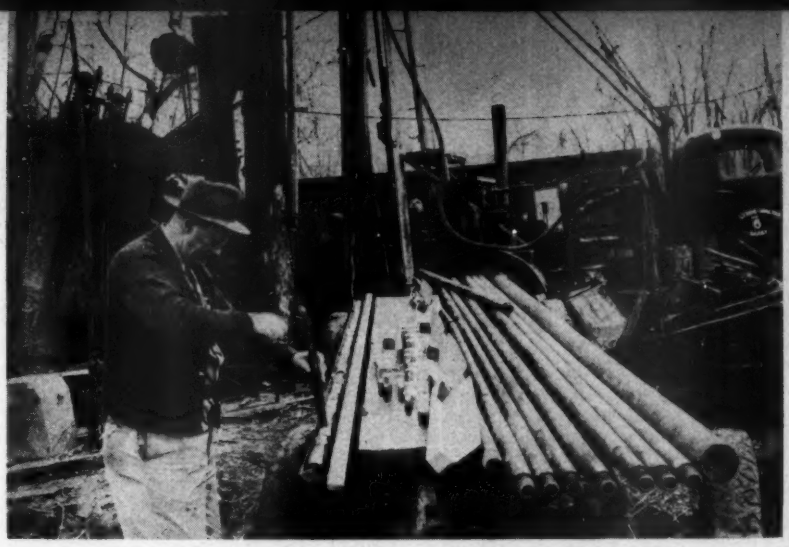
**Over-all development costs:** While oil well and water system constitute the major part of development costs, there is a third which is considerable, although often overlooked. This is the general investment, not applicable to any one lease or department, and includes truck equipment, surface inventory, heavy tools, repair shops, housing facilities, etc. In most instances it will equal 10 to 20 per cent of other development costs.

I have tried to point out that each project requires individual study to make an intelligent estimate of development costs, but to illustrate the ranges in which they run, the lowest total development of which I know, for a completely redrilled flood in 500-ft. territory, in which the new wells were equipped for pumping, was about $1,250 per acre, and will range from that figure to $2,500 per acre in 800-ft. territory. Floods equipped for flowing will have considerably less investment, of which the lowest in my knowledge is $800 per acre. On a cost per barrel of oil recovered, these costs will range from 30 cents to 65 cents per barrel.

### Expense Items

Expense items may be divided into three classes, namely:

**1. Production expense:** The production expense per barrel of oil produced will naturally vary greatly in the life of a flood, from a low cost during peak production and advancing with declining production until economic limit is reached and flood is abandoned. The most important factors are labor, power, repair, oil treatment and taxes. In a pumping flood, labor and power are much larger than in a flowing flood; except for a short period, when the first unit is at its peak production, production rarely exceeds 10 bbl. of oil per well per day, so there is usually a large number of wells to service with corresponding expenditure of manpower. Troublesome wells, with high pulling expense, can be controlled somewhat by converting to flowing wells when expense per barrel is too high. Experience has shown that water produced with the oil is highly corrosive and in early projects maintenance and repair of oil lines has been a large item, but in new installations it is now important to use cement-lined pipe or transite, which reduced this expense to a minimum. In pumping projects the water produced with the oil separates into small particles, and it is necessary to use considerable treating compound, and in the lower gravities in eastern Kansas it is necessary to install an oil heating system, which adds very materially to the expense. While there is very little true emulsion, the water particles are extremely slow in settling without treating and heating. Taxes, of course, are fixed and nothing can be done about them, except in ad valorem states, the assessment valuation should be watched carefully.



*Sampling cores on a Kansas water-flood project*

**2. Water system expense:** This expense may be divided into power, treating, operation, labor and maintenance and repair, of which the first three are the most important. Raw water from surface supply or deep wells must be lifted to the plant site; this head with surface supply is rarely in excess of 50 ft., while in deep wells it may reach 500 ft., and this power cost may well be one of the determining factors in choice of water source. Power cost in the pressure plant is in direct proportion to pressures and quantities used, so this factor should be studied in choosing method of development. All plants should be designed to need as little operating labor as possible. If good equipment is installed and maintained, and care is taken in the water treatment, maintenance and repair of the water system is light, but if water treatment is neglected all kinds of trouble will develop in the water system, causing heavy expense. If a plant is well designed the treating cost is not heavy, usually running from 0.1 to 0.3 cents per barrel of water with surface supply. On this account I do not advocate closed systems which eliminate this cost, but do entail other increased costs, such as additional power and higher maintenance which may more than offset treating expense.

**3. Overhead and administrative expenses:** These will vary with each operator. Many of the larger operators still include their secondary-recovery projects in their regular production department and charge it on a barrel basis with the same proportion of the discovery, exploration and general overhead costs. I believe this is not good practice, as secondary recovery is a distinct new branch of the industry, and as such should have a department of its own, with the administrative costs of that department only charged to it. Some smaller operators pay large executive salaries as a part solution of the income tax problem, which also complicates the situation.

Grouping all of these expenses and starting with a minimum of 2,000 bbl. per acre—as any intensively developed pumping project having less recovery than that cannot be a financial success at the present time—experience has shown that over the life of a project production expense will vary from 15 to 30 cents, water expense from 10 to 20 cents and true administrative expense from 5 to 10 cents per barrel of oil produced. Totaling these items gives a minimum of 30 cents and a maximum of 60 cents per barrel of oil, with the lower recovery projects usually going into the high expense brackets.

Total costs, including both investment and expense, will range from 60 cents in favorable locations to as high as $1.20 per gross barrel oil produced in intensive developments under present conditions. However, these figures are very general and each individual project has to be worked out on its own merits. I believe the most important thing to consider in any operation is efficiency. Water flooding approaches a manufacturing operation and as such the most efficient methods must be used to reduce total overall costs to a point where a profit can be anticipated.

# Flowing Versus Pumping Operations in WATER FLOODING

*by Tom Lawry**

*Water-treating plant on a Kansas secondary-recovery project*

**Flowing wells under water flood has many advantages over pumping, provided proper procedures are followed. In this paper, the author outlines practices used successfully by his company. This article is a slightly abridged version of a paper presented before the Mid-Continent district, A.P.I. Division of Production at Tulsa, May 20.**

FLOWING in water-flood operations has often been considered by operators in the Mid-Continent and the Pennsylvania fields, but the final results have generally not been encouraging. As a representative of perhaps the major water-flood operator in the Mid-Continent area, I have been asked to participate in this afternoon's program to the extent of outlining some of the procedure used by our company in flowing its production, as well as to attempt to explain to my listeners why we are so sold on flowing that not 1 bbl. of oil is pumped if it can be flowed. I shall attempt to explain why we feel that flowing is a very desirable means of production, admit some of its shortcomings, and show why we think we get as much oil by flowing as we would by pumping.

All reference to the word flowing in this paper will mean that act of oil production whereby the oil and water produced from the oil well are brought to the surface by the carry-through of pressure in the sand of the injection water. Fluid is permitted to accumulate in the oil well and in the sand until the pressure of the injection water traveling through the sand is sufficient to lift the fluid in the bore of the oil well. Of course, any water flood under pressure above hydrostatic will flow if the oil wells are permitted to stand unpumped until full, but in most cases that is not considered a satisfactory way to get the oil out of the ground. If an operator goes to the bother of putting tubing and rods in a well, he does not want it to remain unpumped long enough for the hole to fill up. He wants the sand to remain uncovered or nearly so to get the benefit of that last ounce of pressure from the water wells, and not waste any of that pressure lifting oil in the hole. . . .

*Forest Producing Co., Nowata, Okla.

### First Flowing Operation

As far as the writer knows, the first serious attempt at flowing was Forest Producing Corp.'s No. 1 flood. This project showed perhaps the first inkling that flowing was a distinct possibility when the producing wells came in flowing great volumes of oil. This flood had been drilled in accordance with the delayed five-spot plan in which the water-intake wells are drilled 6 to 9 months ahead of the oil. During that time, the water being injected fills the void areas in the sand, recompressing the free gas, and driving some of it back into solution, until finally 100 per cent liquid saturation has been attained. This point shows very well on the intake records, for it appears as if the water had run into a stone wall.

This point of liquid saturation is the sign for the operator to start drilling his oil wells. The first ones will come in violently and usually spray oil unless advance precautions are taken to keep the well under control while the sand is being drilled and the packer set. If the water-intake wells are left on during the time the packer is being placed, and while the cement on the packer is hardening, the well will continue to flow. . . .

This matter of delayed drilling is the first of two departures from conventional operations in flowing. A logical question here would be why not drill the oil and water wells together, and shut the oil well in until that point of 100 per cent liquid saturation had been reached and then open the oil well and begin taking the oil without having to drill the oil well into the formation when it is under pressure. This is perhaps an unnecessary digression from the subject of flowing, but it is a question which we asked ourselves at one time, and had to find the answer the hard way. There is an honest difference of opinion among operators on this point, so perhaps our experience will help someone else avoid the same mistakes.

In the Bartlesville sand area, we find many variations in sand conditions from well to well and pool to pool, with the consequence that no two wells may ever be said to be alike. Some operators have attempted to overcome the shortcomings of sand conditions by ccring all wells and selectively shooting the sand in an attempt to even out the variations. This is a fine approach to the problem, but hardly one for a company with 10 strings of tools running all the

time and only one man in the laboratory. So we accept the nonuniform sand conditions and try to operate so they will give us the least amount of trouble.

If we take one well as an example, we may find that it has a fairly uniform permeability profile except for one 5-ft. streak in the middle which is about three times as permeable as the average. If that well is shot without regard for the more permeable streak, and is equipped for water injection and put to work, the first thing that will happen is that the streak will start to take more water per foot of sand than the rest of the section, and in a short time, the oil in that streak will have been pushed on through the five-spot and will begin pouring into the shot hole of the already drilled oil well.

If the oil well has been shut in, the air or gas in the tubing of the oil well will be compressed, and the fluid will partially fill the tubing, then if there is still oil to come from the streak, pressure will begin to build up on the oil well and a backflood of oil will begin to work on the less permeable section of the sand in the oil well, because the less permeable section of sand in the water-intake well has not received enough water to pressure it through the five-spot from the water well to the oil well. So we find water in the water-intake well working on the tight or average permeability sand while across the five-spot in the oil well we have a backflood against that same sand but the backflood is by oil. For a long time we thought that we were not losing anything, because we would get that backflood oil out again, until we ran some laboratory experiments and found that we do not get that oil out at all; in fact the sum total of it is that we lose oil, because where in normal operations we can reduce residual-oil saturation to about 20 per cent, in the cores flooded with oil, the best that we were able to reduce were oil saturations from 30 to 40 per cent; in most cases we left more oil than we started with.

What apparently happens with backflood by oil is that the oil drives out the connate water to an extent that the sand becomes hydrophobic or oil-wet instead of water-wet, and in that situation will normally have a much higher residual saturation.

If the loose streak holds only a little oil, not enough to fill the shot hole and tubing of the oil well, we have a backflood by water into the average-permeability sand and delay the bringing-to-production of the flood by as much water as is permitted to backflood through the oil well. We thus consider the drilling of oil and water wells simultaneously poor practice, and refrain from it unless forced to it by unfortunate circumstances.

Having considered the case for delayed drilling as the first departure from the conventional operation in connection with flowing, the second departure is that of cementing the tubing on a packer in the oil wells. Almost all water-intake wells are cemented in with packers as a matter of good operation, but the finality of cementing the tubing in an oil well is too much for a lot of operators. They like to feel free to pull the tubing out of the well if it doesn't act right, and go in with a sand pump or second light shot. Of course they have to pull rods and tubing often enough when they are pumping an oil well, so it becomes second nature to do it if anything else goes wrong. In flowing, this cannot be done, but several next best things can, and in flowing at least there are no valves or cups to change.

### Advantages of Flowing

The advantages of flowing over pumping are many, and the corresponding savings quite appreciable. Because they are so closely united, they will be treated together.

The first advantage is simplicity of operation. Except for a few of the very deep water-flood projects which operate by gravity, all water floods have a pressure plant to force the flooding water into the sand under pressure. If that plant can be made to serve the dual purpose of putting water into the ground, and taking the oil out, the mechanical problems have been reduced to their simplest form. And that is just what flowing involves. Instead of the pressure head being entirely expended in the formation as is the case in pumping, part of it is reserved to lift the oil and water from the bottom of the oil well to the surface, instead of installing central powers and pumping jacks or individual pumping units to do the job. And all the arguments over flowing revolve around this point of whether it is cheaper to risk not getting as much oil by flowing, or do the job the expensive way and pump to get what is hoped is more oil than would be obtained by flowing.

By utilizing the energy from the pressure plant and omitting the central power or individual units, there is, of course, less machinery, and fewer moving parts to maintain, lubricate, and replace periodically. The prime mover begins to wear out and get harder to keep going; the belt stretches and finally wears out, and the eccentrics on the power wear thin in one place and finally give out; the surface rods get thin from running over the same post day after day; the pumping-jack foundation pulls loose and swings around; the sucker rods become fatigued and break with greater regularity, and the load on the oil wells becomes greater with more and more water to be handled as the age of the flood advances. Valves and seats wear out faster and faster. To the harassed operator of a pumping water flood, this matter of simplicity of operation is a serious thing.

In addition to mechanical simplicity, we find that the manpower situation is also simplified. The water-plant man or water-meter man, depending on whether the project is small or large, can take care of the water-pressure lines and wells and keep things going on that end regardless of how the production is obtained. If the lease is pumped, the pumper usually looks after the oil wells and lines, but in addition, he must see that the pumping engine is kept running and well lubricated; keep his rod lines greased so the well will get all of the stroke possible on the power and, at the same time, depend upon the well-pulling crew to keep his wells in shape so he can keep his production up. Thus, contrasting the switcher on a flowing job who has nothing to do but check his oil wells and oil lines and occasionally change from one tank to another, and the pumper who must baby his engine along 9 months of the year because the gas is low, and hound the foreman to get such and such a well pulled yet today because it is the best one on the lease as well as act as oiler to a thousand places that squeak at will, it is safe to say that the switcher does a lot more toward escorting the oil to the tanks than can the pumper.

The material that is saved by flowing against pumping has been implied in the above. All the pumping equipment except a string of tubing can be saved, including usually a string of casing. If the hole is wet during drilling, a temporary string is usually run until the cement on the packer has set when the casing may be pulled for reuse. . . .

When Forest's No. 1 flood was converted from pumping to flowing, we found another advantage in flowing that has not been readily discerned. . . . On two leases which were converted from pumping to flowing, there is a distinct upward displacement of the decline curve, followed by a more gradual flattening of the curve than obtained during pumping. All of these leases were drilled according to the delayed five-spot plan as mentioned earlier. . . .

A new technique used in water flooding that is adaptable best to flowing projects is that of limited withdrawal, similar to that used in flush fields under proration where the day's production is taken in a few hours or minutes and the well shut in again for the remainder of the 24-hour period. In water flooding, the oil wells are drilled when 100 per cent liquid saturation is attained, and as nearly simultaneously as possible,

so that all wells are at peak production at one time. When all of the wells have been drilled, the packers on the bottom of the tubing cemented in, and the wells capable of being shut in under pressure, the oil wells are flowed wide open for 1 or 2 days to determine the potential of the lease, after which some preestablished time or fraction of the day from 18 to 22 hours is taken as the daily quota. The gage is given to all switchers as the amount to take from that lease and no more. For a day or two it will take that long to get the oil, but shortly the time will have been reduced by ½ hour, then 1 hour, and on down until possibly only 12 hours will be needed to get what used to require almost a full day. In the meantime, the oil wells are shut in, and allowed to pressure up with the intake wells going along unhampered 24 hours a day. . . .

**Reservoir Action**

The ideas behind this plan might be described this way: When an oil well penetrates the formation under pressure, certain flow lines or patterns are established—in a homogeneous medium they might be considered a series of pipes running in the shortest possible line from intake to producer, and only as wide as the fluid moving at any one time would require. Now if we drill an oil well into the sand, and establish these patterns, and never do anything to throttle those same pipes, there is little reason to believe that any of the other little pipes in the five-spot will ever be called into operation once their original pressure has been expended. But by alternately pressuring and relieving the pressure on the formation oil will be forced along into those most active pipes and become recoverable oil. It is assuming much to look on the actual operation as functioning in that manner, but we do feel that the alternate pressuring and release of pressure must cause that ordinarily unaffected oil to move along out into the zone of active influence.

Some of the things that we have seen in connection with this limited withdrawal technique is: (1) In no case have we failed to get more oil on the lease where this was used than from adjoining leases where the conventional 24-hour flow was used. (2) Flooding efficiency, or the per cent of the total recoverable oil obtained by the time of appearance of the first water at the producer, is always higher. (3) The danger from water bypassing oil in the sand is substantially lowered due to the fact that a good bank of oil is kept ahead of the water, and because of the back pressure somewhat lower injection rates are employed.

Among the objections to flowing, the primary one is that it keeps a back pressure on the sand and lessens the actual work done by the injection water. We admit that the back pressure is there, in fact we deliberately add to it to increase our recoverable oil. Our results indicate that the highest possible pressure attainable is not necessarily the most economic because of the danger that too high rates of injection will cause bypassing of oil. Many of the watered-out areas in the old Bartlesville field show residual saturations lower than we can obtain by our forced water drive, yet they operated at probably less than hydrostatic pressure. . . .

A second objection to flowing is the necessity for cementing the tubing in on the packer. This really is no trouble until a leak develops in the tubing. Then a companion string of pipe with left-hand threads is used to fish the offending joint out by unscrewing the original right-hand thread pipe as far down the hole as possible, and then substituting the left-hand thread pipe to get a new hold and unscrew further down the hole.

If it becomes desirable to clean cavings from the hole, an insert string of pipe, ½ or ¾-in., may be run and the hole subject to alternate or successive flushings and purgings with water and compressed air.

# Questions on Operation

**We are having trouble getting cement to set in a well which has considerable salt in it. What can be done to make the cement set?—M. F. R., Midland, Tex.**

A number of wells have encountered similar trouble and the best remedy to date seems to be the making of the slurry with salt water instead of fresh water.

Those having experience in plugging off salt sections report that the cement becomes a chalky powder with practically no bonding qualities. This is probably because the salt in the formation is hygroscopic. the water with which the cement is mixed is pulled out before the reactions can take place which cause the cement to set. By using salt water instead of fresh water, the moisture is retained in the slurry until the cement is set.

It is possible that forcing the cement slurry into the salt section might also be helpful as this would prevent, in part at least, the water leaving the cement and going to the salt. Another possibility, not recommended, is to use a heavy slurry and wait until it approaches the end of the thickening time before placing it. The cement then would set before the water could escape from it. This is dangerous, however, as any delay in placing the cement would result in its setting in the pipe and its removal would be troublesome and costly.

The use of salt in the mixing water has proven the most successful. The exact amount of salt added varies with type of cement and water being used for mixing and the conditions in the well. Some experimentation with different percentages of salt and different weight slurries will indicate the correct amounts of salt, water and cement to use. This method allows the best possible cement job to be obtained under the circumstances.

If the cement being used does not already contain calcium chloride, small amounts of it (2 or 3 per cent) may also be employed. It will accelerate the setting of the cement and it also has a great affinity for moisture. Cement manufacturers should also be consulted on what they have to offer in the way of special cements to meet this problem.

# BOOK REVIEWS

*Vanderbilt 1942 Rubber Handbook. Edited by J. M. Ball. Published by R. T. Vanderbilt Co., New York. 464 pp. $5.*

This handbook has been prepared primarily for the new men now coming into the rubber industry, and for those who will continue to come into it during the next 5 years or more. The new features of this edition are the articles on reclaimed rubber and artificial rubbers and those on compounding representing the various branches of rubber-goods manufacture.

*Trees & Test Tubes. By Charles Morrow Wilson. Published by Henry Holt & Co., New York. 352 pp. $3.50.*

The whole dramatic panorama of rubber's history, from its discovery down to the present. A full account of the rubber crisis and its future solution, and the complete text of the Baruch reports.

*Mexican Oil. By Harlow S. Person. Published by Harper & Brothers. 83 pp. $1.50.*

This book grows out of a report which supplied the factual basis for the agreement reached between the United States and the Mexican governments for indemnifying American owners of Mexican oil wells which were expropriated by the Mexican Government.

# Chemical Removal of Scale Is Factor in Speeding Production

*by Harry F. Simons*

**Highly specialized equipment and experience in its application and use have been developed over the past several years until the chemical treatment for removal of scale from vessels has become a very important tool of the industry. Recommending the method are its speed, ease of application, a minimum of dismantling of the vessel and a more complete removal of the scale.**

**Of primary importance in the use of chemicals for scale removal are the selection of the correct inhibiting chemical, or chemicals, which will prevent any damage to the equipment, use of auxiliary chemicals which will hasten or assure complete removal of the scale, and the choice of the optimum treating temperature for the solvent employed.**

**Composition and structure of the scale, as well as the metals in the system with which the treating solution will come in contact, influence the selection of the chemicals used in the solution and the design of the treatment.**

FORMATION of a scale which reduces the efficiency of the heat-exchange occurs in practically all vessels and equipment handling fluids or vapors. It is particularly bothersome in all types of boilers, heat exchangers, cooling towers, radiators, engine jackets and preheaters, but it also affects equipment handling fluids other than water, such as bubble towers and other refinery and natural-gasoline equipment.

The recent introduction of the process whereby water or steam-deposited scale is removed chemically is a major industrial advance. The principal advantages of the chemical treatment are ease of application, no dismantling of the vessel, reduced time required to clean the vessel, and a more complete removal of the scale. In some cases, vessels have been cleaned in a matter of hours where formerly it required days or even weeks to accomplish a less satisfactory result. Successful use of the method depends on the experience and skill of the one designing the treatment and on the employment of specialized equipment developed for this work.

Generally the troublesome scales consist of insoluble carbonates, sulfates, silicates, hydroxides and often oxides of iron which precipitate out of the fluid on heating. As the scale builds up, the efficiency of the system is reduced and consequently either a greater surface must be used or additional heating or cooling medium applied. In the case of boilers, the deposition of scale 0.05-in. thick may reduce the steam output about 10 per cent. Increasing the intensity of the fire may make up for this deficiency but at best this adds to the fuel cost and it may be even necessary to add another boiler to the line; where fire intensity is increased there is danger of overheating a portion of the vessel sufficiently to cause a failure.

Efficiency of both heating and cooling equipment can be increased by the use of a properly designed closed system requiring little makeup water and by the use of an adequate pretreating system which prevents rapid scale deposition. However, some scale is almost certain to form and eventually build up to the point where it must be removed.

Table 1 shows the composition of commonly encountered scale thickness and heat loss.

TABLE 1

**Thickness of Scale vs. Heat Loss**

| Composition of scale— | Thickness (in.) | Per cent heat loss |
|---|---|---|
| Hard—mostly carbonate | 0.02 | 5.4 |
| Hard—mostly sulfate | 0.04 | 9.3 |
| Hard—mostly sulfate | 0.05 | 11.1 |
| Hard—mostly sulfate | 0.111 | 15.9 |
| Soft—mostly carbonate | 0.031 | 7.2 |
| Soft—mostly sulfate | 0.062 | 10.8 |
| Soft—mostly carbonate | 0.091 | 15.0 |

It will be noted that the difference in the type of scale affects the heat loss, although the loss of heat transfer is roughly proportional to the scale thickness. Porosity of the scale, its density and hardness and its chemical composition also play a part.

The most widely used chemical for removal of scale in boilers, etc., is hydrochloric-acid-base solvent with an inhibitor necessary to prevent corrosion of the metal in the vessel to be cleaned. Accelerators, wetting agents, and surface-tension reducing agents are also useful in scale-removal work. Special solvents are used where the scale is covered with an oily film which would prevent contact with the scale. With some scales, better results are obtained with organic solvents than with inorganic acid and the usual auxiliary chemicals.

### Nature of Treatment

The type of scale to be removed and the size of the vessel dictate the treatment to be used and the strength and composition of the solvent employed. In many cases it has been found that a scale with a comparatively low solubility (15 per cent) can be removed more readily than one with a reasonably high solubility (30 per cent). This is mainly due to the conditions under which the deposition of the scale took place. If the cementing material is the soluble part of the scale, the solvent breaks down the bond and the scale is knocked loose and falls to the bottom of the vessel where it can be washed out. If the soluble layer is next to the metal, its solution likewise allows the scale to drop off, provided the binding layer can be reached by the solvent. A few scales with extremely low solubilities in hydrochloric acid base solvents, such as some silicate and sulfate scales, present a difficult problem, particularly when they are deposited directly on the metal in the vessel. Increased time of treatment and addition of auxiliary chemicals are necessary where the scale is a type difficult to treat. Proper use of auxiliary chemicals is important in assuring complete removal of the scale deposit.

The temperature of the solvent has a definite effect on the rate of reaction on various types of scale. Complete removal of the scale often requires elevated temperatures. The maximum temperature required during the treatment should be predetermined so the proper inhibitor for

complete protection of the metal may be used. Presence of brass, bronze, cast iron, alloys, steel, etc., must be known and considered as some inhibitors are more effective on certain metals than on others.

### Analysis of Scale

An X-ray machine has been found useful in analyzing the type of scale and designing the treatment and solvent for its removal. Each crystalline substance gives a diffraction pattern characteristic of its structure and the pattern obtained from the scale can be compared with diffraction patterns of standard substances. A special machine which takes 24 exposures simultaneously is used for this analytical work.

The amount of scale to be removed also must be known to the one designing this treatment. It takes approximately 1,000 gal. of 15 per cent hydrochloric acid to dissolve 11 cu. ft. of pure calcium carbonate and more for other type scales and calculating the amount of acid base solvent required involves a measurement of the scale thickness, the chemical composition and the area over which it is deposited. The total volume of the unit being cleaned out must be known in order to have sufficient solvent to contact all of the scale deposit.

Probably the outstanding advantage in the chemical method of scale removal is that the solvent can get to any place where the scale has been deposited by the fluid handled in the vessel. In the mechanical cleaning of boilers, for instance, only the tubes are cleaned, leaving the crown sheet and the tube sheets still dirty. Heat exchangers can be cleaned without being torn down and the scale effectively removed from water jackets on engines and compressors.

Another important factor is the complete removal of scale by the chemical method contrasted with the incomplete removal by other methods. On many types of equipment this is extremely important as the deposition of scale is quite rapid once it gets started and if only 75 to 90 per cent of the scale is removed, another cleaning will have to be scheduled in a short time.

Where time is important, the chemical treatment is especially valuable. On one industrial installation the normal procedure was to shut down a boiler for about 2 weeks while 12 to 15 men, working in shifts around the clock, cleaned the tubes mechanically with an efficiency of about 75 per cent. Complete chemical removal of the scale was effected in 24 hours. Open-type box condensers and cooling headers which normally require from 2 to 3 days for removal and sandblasting can generally be cleaned chemically in less than 4 hours.

A gasoline plant in the Mid-Continent had trouble keeping steam sufficient to operate with six boilers totaling 675 hp. The boilers were cleaned one at a time, approximately 8 hours being required to take a boiler off the line, clean it chemically, put water in it and get it back on the line. After cleaning the boilers, five of them were able to supply enough steam to keep the plant running at capacity.

A good example of the effect of cleaning equipment was experienced by one refinery which had three lean-oil coolers with a throughput of 13,000 bbl. daily at an outlet temperature of 118° F. Chemical cleaning of the heat exchangers required 2 hours, after which the throughput of the lean-oil coolers was gradually boosted to 33,000 bbl. per day with the outlet temperature of 90° F. In other words, the throughput of these vessels was increased two and a half times while the temperature of the oil was reduced 28°. The reduction in temperature is extremely important as absorption of gases by lean oil is much greater at lower temperatures.

### Several Treating Methods

Because of the large number of types of vessels which can be cleaned by this method a number of treatments have been devised. Where the capacity of the vessel is relatively small, a circulating method is used. If it would not be feasible to fill the vessel completely with the chemical, such as in cleaning an open-box condenser or a cooling tower, a spray treatment may be necessary. For cleaning bubble towers or absorption towers the percolation method is used. When cleaning long pipe lines,

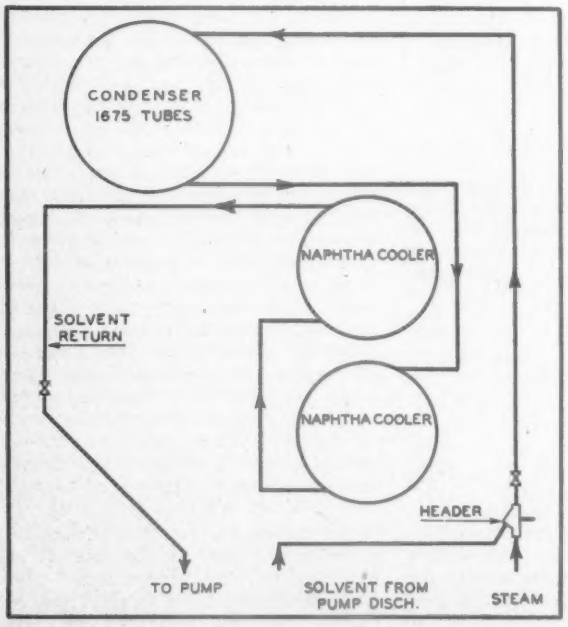



*Fig. 1—Acid for removing scale enters condenser tube box, passes through lower naphtha cooler and exits through top of upper naphtha cooler*

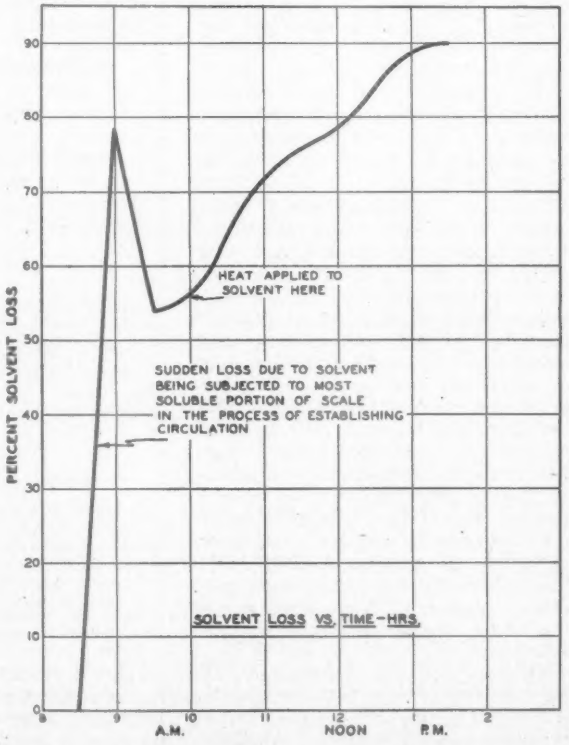



*Fig. 2—Loss in strength of acid plotted against time shows how removal of scale by acid is progressing. When constant figure is reached, treatment is concluded*

# THE SAME METHODS WILL WIN YOUR POST-WAR BATTLES

*Since welding is taking such a big hand in winning the war, why shouldn't I watch it closely for ideas to win my battles for business after the war?*

**ALTER EGO:** That's logical. Where you see welding, you see faster production and far better ships, planes, tanks and guns. The same basic methods can be used after the war to cut costs and build better autos, machines, appliances and buildings.

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**ALTER EGO:** Sure! In the first place, they're welded. And they're welded fast. Ever hear of welding 10 to 14-gauge sheet with 3/16" electrode? Usual practice requires 1/8" or 5/32" size. This shop developed fit-up jigs and positioning fixtures to allow the 3/16" size. *This bigger electrode saves them 33% in man-hours.*

*Then, the big problem is not only to find ways to apply welding to my post-war products, but to find ways to beat competition on the cost of my welding.*

**ALTER EGO:** You're right. You should use this double approach to post-war profits by keeping an eye on the big war-job welding is doing . . and by all means, ask for Lincoln cooperation on design and production.

**THE LINCOLN ELECTRIC COMPANY**
CLEVELAND, OHIO

*then I said to myself—*

**THERE'S ALWAYS SOMETHING NEW UNDER THE ARC**

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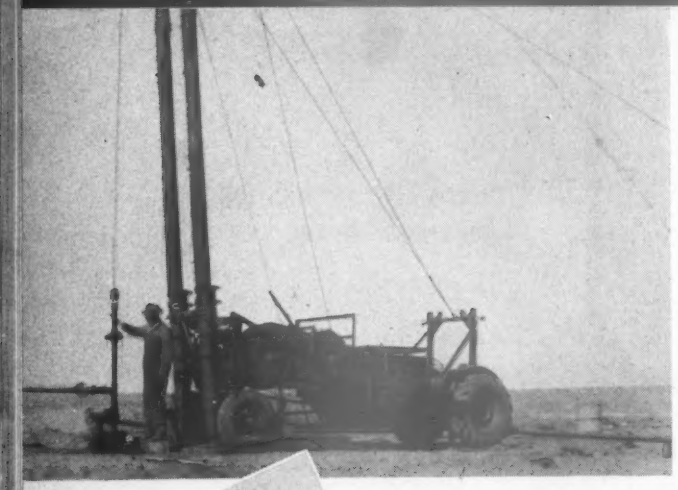
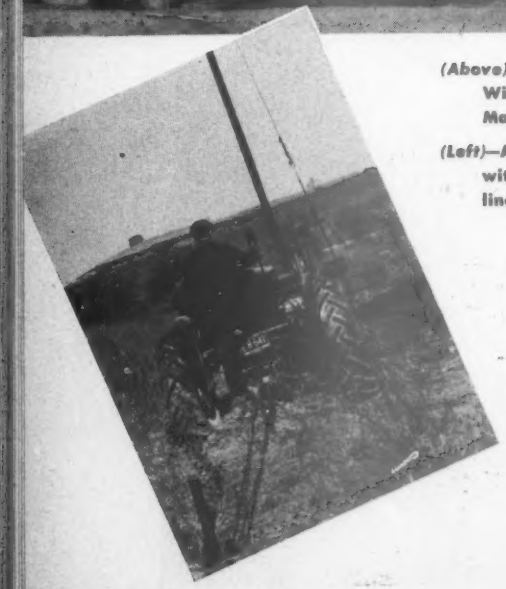
**An all around servicing unit that will "keep 'em pumping" for Victory. The Allis-Chalmers Model M Double Drum well servicing winch tractor, with telescoping mast and dual wheels. This unit has a maximum line pull of 32,600 lbs. Winch Drums operate separately.**

# HOW'S YOUR Well Servicing Equipment ?



**And we mean it! Because the condition of your wells in 1944 is going to depend on the durability and performance of your well servicing equipment this year. So get the best maintenance equipment *available*—it's ALLIS-CHALMERS.**

Whether your lease has one well or one hundred—with every offset drilled or widely scattered wells, you can select a proper type of mobile unit that will maintain your wells. And because A-C units are built to handle heavy loads *easily*, you'll find that wells serviced with them, show little damage to hard to replace pumping equipment—you don't have to run-into a load to lift it—and the load is *always* under control.



*(Above)*—Here's the A-C Model E Double Drum Winch Tractor, with Two Pole Telescoping Mast. Maximum line pull 58,970 lbs.

*(Left)*—A-C Model W Single Drum Winch Tractor with Single Pole Telescoping mast. Maximum line pull 20,666 lbs.

**The complete line of ALLIS-CHALMERS well servicing equipment includes: Three sizes double drum tractors; Four sizes single drum tractors; Four sizes skid winches; Two sizes tractor spudders; Three sizes skid type spudders, and one skid type drilling unit for rotary or cable tools.**

**MODEL E**
**Line Capacity ½"**
**9,740 ft.**
**Road Speeds**
**15 or 30 m. p. h.**

**FUELS**
**Natural Gas**
**Butane**
**Gasoline**
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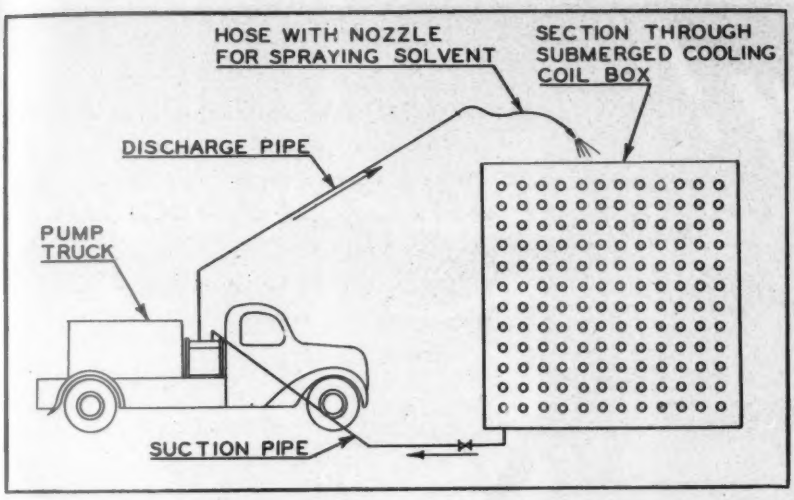


*Fig. 3—Hookup for the removal of scale by acid applied by spraying on tubes. Pump picks up acid from bottom of condenser box and returns it through the hose*

where it is not feasible to lay a return line, use of a pump truck at each end and the passing back and forth of the chemical has been found successful.

Special truck-mounted units have been designed for the scale-removal treatment. These include in their equipment tanks for holding the basic and auxiliary chemicals, pumps for circulating the solvent and a steam header for controlling the temperature of the chemical.

The capacity of the vessel to be cleaned is computed and the amount of chemical required to dissolve the scale calculated. Auxiliary chemicals which insure complete removal or which shorten the time required are then selected. In case the amount of solvent required to effect solution of the scale is less than the volume of the vessel, dilution is employed if the circulation method is used. If dilution reaches to 4 or 5 per cent acid, heat is employed to speed up the process. Inhibitors to be used are then selected with the treating temperature and metals in the vessel being considered.

The equipment to be cleaned is always drained and isolated by valves or disconnected piping, from all other equipment.

The usual practice is to have the equipment prepared for cleaning by the operator's own personnel under the supervision of the service company. This permits less loss of time and more rapid return of the equipment to service.

The connections between the unit to be cleaned and the solvent tanks and pumps should be made in such a manner that control of the treatment is maintained. Usually the vessel to be cleaned may be filled by connecting the solvent line to an opening at the bottom. A suitable vent or return line should be available at the top of the unit.

Often several vessels can be cleaned simultaneously, another time-saving factor (Fig. 1).

Periodic tests are made of the solvent to determine its concentration. This is important because it is the only way of determining if the scale deposit is reacting with the solvent. After a definite period of time has elapsed during which the solvent has been in contact with the scale the unit is drained, flushed with water, inspected and returned to service.

The strength of the solvent is tested either by titration with a suitable indicator or by the quantitative measurement of the carbon dioxide liberated in a reaction with calcium carbonate. The titrating method is not always applicable because of discoloration of the acid during treatment, making the end point difficult to establish. Successful use of the quantitative measurement of the carbon dioxide depends on previous laboratory work to establish the necessary curves and charts for the treating engineer's guidance.

The circulating treatment is used on boilers, heat exchangers, preheaters, coolers, refrigerating units, engine and compressor jackets, etc.

### Spray Method

The spray method in Fig. 3 (used in open-box condensers, cooling towers and vessels where the establishment of circulation would require too much acid or excessive dilution) uses a discharge line and hose to the top of the vessel and a return line to the truck tank from the lowermost connection. The treater then stands above the equipment to be cleaned and sprays it with chemical coming through the hose at considerable pressure. The treater can easily see when the scale is completely removed and the tubes are clean.

The percolation method (used on bubble and absorption towers) consists of pumping the solvent in through a connection in the top of the tower and allowing it to trickle down through the weirs and bubble plates. Solvent is picked up at the bottom of the tower and recirculated until successive tests show the solvent concentration to be constant.

Some types of scale have a slow reaction rate and the removal by circulation, even using hot solvent would require a long time. In such cases, soaking is resorted to, the vessel being filled, an upper vent opened to permit escape of the gas, and the vessel left filled with solvent over night or longer if necessary.

Principal cost of the treatment is the price of the solvent, the amount depending on the size of the vessel and the type and thickness of scale to be dissolved in it. Labor and down-time charges are reduced substantially, thus more than offsetting this cost. Increased effectiveness of the equipment more than repays the cost of cleaning it.

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5. Chemical Removal of Scale From Heat Exchange Surfaces, G. F. Williams, Power, Jan. 1943.

## May Publish Fourth Edition Of Physical Constants of Principal Hydrocarbons

A fourth edition of "Physical Constants of the Principal Hydrocarbons," by M. P. Doss, has been suggested by the technical advisory committee of the Petroleum Industry War Council, and will be published by the Texas Co. if sufficient advance orders for copies are received.

The third edition, issued in March 1942, contained 215 pages and listed the properties of more than 2,000 hydrocarbons. In the proposed new edition, scheduled to appear about May 20, more than 100 pages will be revised to include new or corrected data, particularly on hydrocarbons related to the manufacture of aviation gasoline, synthetic rubber, synthetic resins, and toluene.

The book will be available at cost—approximately $5 a copy. Requests for copies may be addressed to M. P. Doss, Texas Co., 135 East Forty-second Street, New York, N. Y.

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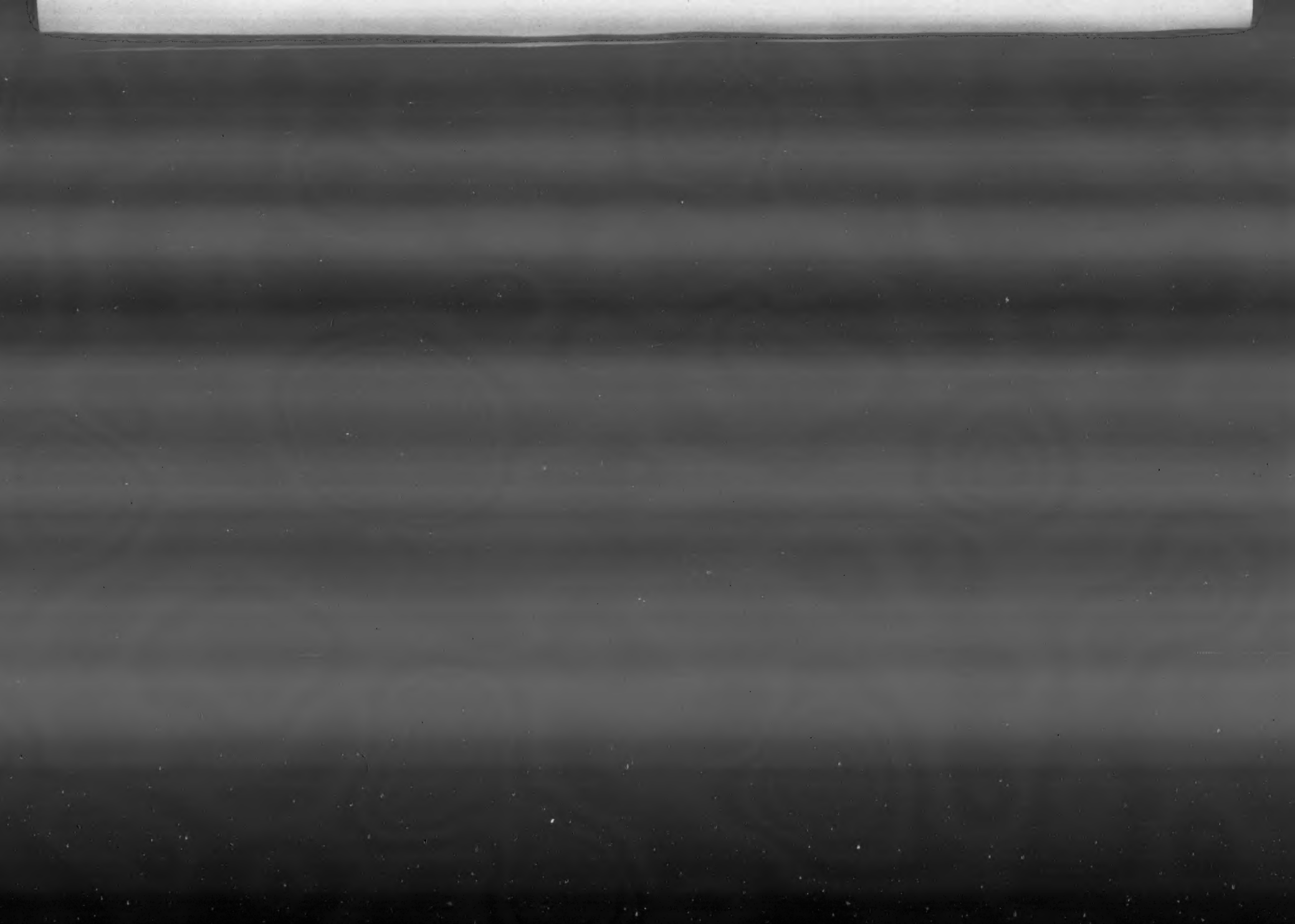
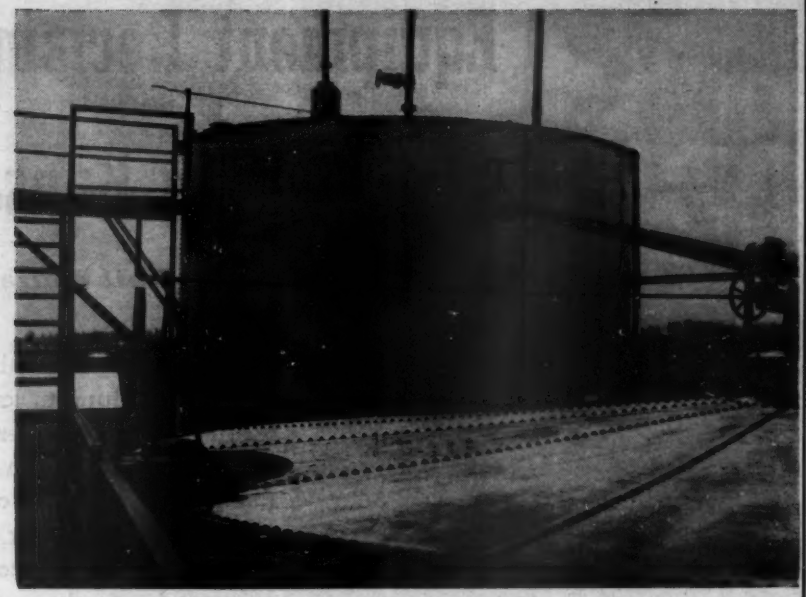


# OPERATING IDEAS

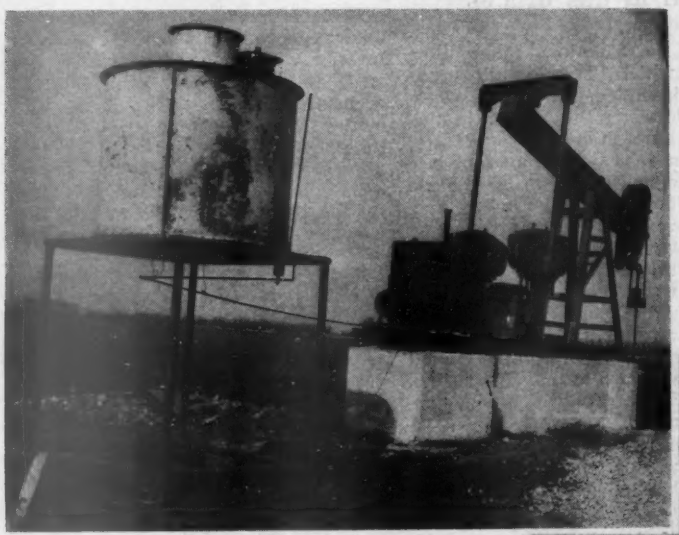
## Elevated Gasoline Tank for Pumping-Engine Fuel

IN some parts of the Lindsborg field, McPherson County, Kansas, where neither natural gas nor electricity is available, operators use gasoline for pumping wells. Most of the wells are pumped with 10-hp. engines, convertible to gas. In the use of gasoline a 10-bbl. vaportight fuel tank is set up at each well. Gravity feed to the engine is provided by elevating the tank above the engine level. The lightweight stand is constructed of sections of old 2-in. tubing. A ¼-in. feed line extends from the tank to the engine carburetor. This is equipped with an adjustable flow-control valve at the tank outlet.



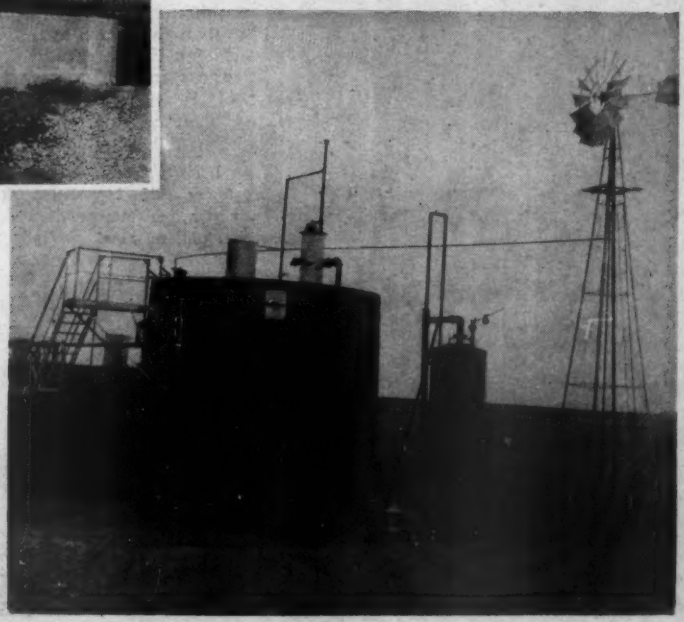
## Remote Control for Tank Flow Valves

FLOW-CONTROL valves on top of field-tank batteries often are located in the center of the tanks or on the opposite side from the catwalk. To keep from having to climb across the tops of the tanks to reach the valves, operators usually rig up some means of remote control so that the valves can be turned from the catwalk. One such remote control, easily constructed, is shown in the accompanying picture. It consists of a rod the length of the distance from the valve to the catwalk. One end is welded or clamped to the center of the valve wheel. The catwalk end, bent in the form of a crank, is supported on a simple A-frame stand within convenient reach of the operator. Although the valves shown in this installation are located along the centers of the tanks, in most of the newer tank battery hookups the flow lines and valves would be located along one side of the tanks.



## Windmill Supplies Water for Tops of Wooden Tanks

USE of wooden field tanks requires that the tops be kept wet. Most of these tanks are constructed with a false top having a space of several inches between it and the actual top. This space is kept filled with water. To supply the water, an operator in one Kansas field has provided an individual well at each tank battery and pumps each well with a windmill. A 1-in. water line from the well extends across the tops of the tanks of a battery with feeder-line connections to small reserve tanks, one on top of each tank. The reserve tanks are kept full by occasional operation of the windmill, and the water drains by gravity through a small line feeding into the space in the top.

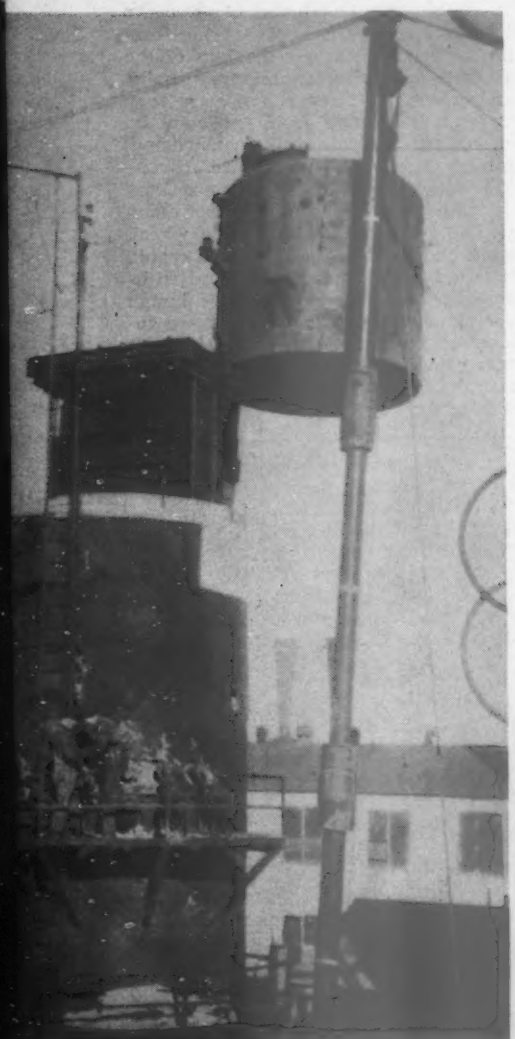


# Equipment Reclamation Saves Materials in Kansas Refinery

*by Neil Williams*

**The difficulty of obtaining certain equipment and materials has led refiners to various expediencies in making needed additions and replacements to their plants. How effective utilization of salvaged equipment was made in one large Kansas refinery to reduce requirements for new materials is described in this article.**

EQUIPMENT salvaging and reclamation work undertaken by Globe Oil & Refining Co. in its refinery at McPherson, Kans., has enabled this company to make necessary plant replacements and additions with a minimum of new critical materials. Use of new materials has been made only where the standards for safe operation required, or where other equipment for specific needs could not be obtained. The program has called for rebuilding much equipment in its adaptation for functions other than those for which it originally may have been intended. All of this work has been done on the job or in the company's own shops.



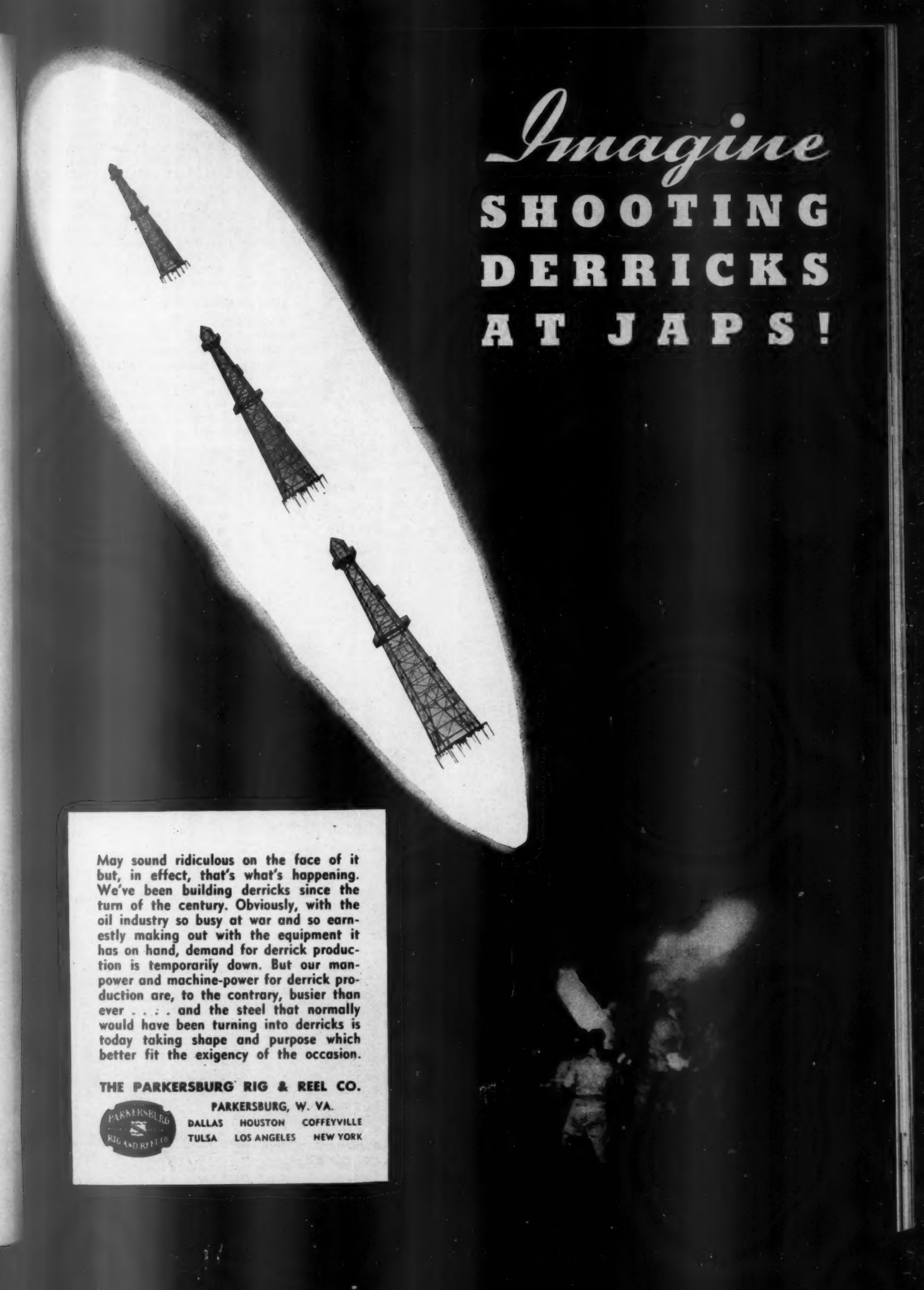
One of the most important jobs has been the reclamation of an 11-ft. 6-in. i.d. by 66-ft. fractionating tower and overhead vapor line. Inspection had revealed that inside corrosion had reduced the thickness of the metal in the top of the tower and in the line to a point that it was considered too weak for safe operation. Originally the thickness of metal in the tower had been ¾ in. while that of the line had been ⅝ in. At inspection, the thickness in each case was down to about ¼ in. Corrosion in the tower had been confined to the top 12 ft., leaving the remainder of the tower in good condition. To save as much of the tower as possible, it was decided to attempt to replace only the part actually affected by corrosion. In this job (Fig. 1), the corroded section, 11 ft. 6 in. in diameter, was removed intact as another use for the unit was waiting. While supported with a boom, it was cut off at the desired level just below the corrosion limits, and then was swung to the ground. A complete new section, fabricated to specifications, and stainless steel lined, then was hoisted into place and welded onto the tower.

*Fig. 1 (left)—Replacing top of fractionating tower. Fig. 2 (below)— Reclaimed 16-in. vapor line, interior of which was lined with stainless steel*

### Lining of Vapor Line

Reclamation of the vapor line (Fig 2) was accomplished by lining the interior with stainless steel. The line is 16 in. in diameter. With a 12-ft. arch, the bend is 20 ft. 4 in. from center to center at the ends, total length of the pipe in the bend being approximately 36 ft. To line the interior of such a line it was necessary to cut it into short sections, which was done with a torch. Each section was about 4 ft. long, enabling the welder to reach half way in from each end. The stainless steel was applied in 4-in. strips until the entire interior of each section was lined. The sections then were rewelded together in their original place to form a single unit.

Along with this a large, high-pressure control valve that had been corroded badly on the interior was reclaimed in a similar manner. Under normal conditions this valve might have been discarded, but since repair it is considered in practically as good condition as when new. To reach the




May sound ridiculous on the face of it but, in effect, that's what's happening. We've been building derricks since the turn of the century. Obviously, with the oil industry so busy at war and so earnestly making out with the equipment it has on hand, demand for derrick production is temporarily down. But our manpower and machine-power for derrick production are, to the contrary, busier than ever . . . . and the steel that normally would have been turning into derricks is today taking shape and purpose which better fit the exigency of the occasion.

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*Fig. 3—High-pressure control valve cut open for metallizing. At right, welder rebuilds 16-in. vapor line*

interior, the top of the bowl was removed by a cut with a torch around the circumference at a point just above the mid-section (Fig. 3). The metal on the interior of the two sections then was built up with a 25-20 rod (25 per cent chromium and 20 per cent nickel) to the desired thickness. This done, the top of the bowl, which had been cut off, was welded back in place. The valve was then placed in a home-made annealing furnace (The Oil and Gas Journal, April 8, 1943, p. 94) and stress relieved.

### Tower Top Made Into Filter

The corroded 12-ft. section which was removed intact from the top of the fractionating tower was converted into a filter in the water treating plant (Fig. 4). As maximum pressure handled in the filter is only 10 lb., the ¼-in. thickness to which the metal had been corroded was considered more than adequate for this service. The section converted to a filter is shown in an accompanying picture. No additional metal was required for the conversion. A solid bottom was formed by cutting the lower part of the side walls into segments, which were shaped inward to the mid point and sealed by welding. The unit is mounted upon legs, consisting of short sections of piping set up in the concrete floor. A flanged cover was provided for the former vapor-line outlet, through which the filtering agent is placed. No other alterations were necessary except for cutting the necessary opening for circulating line connection fittings.

In another job, an old stripper tower was converted into a scrubber (Fig. 5). The stripper formerly had been in high-pressure and high-temperature service, but the walls had been corroded from an original thickness of ⅜ in. to about ⅛ in., which was not considered adequate for that function. The scrubber is operated at sufficiently lower temperatures and pressures to permit the safe use of the thinner metal. For the scrubber, the top 15-ft. section of the tower, which is 4 ft. in diameter, was used, the remainder of the tower being salvaged for other purposes. A bottom plate then was welded on. Inlet and outlet openings were cut at the desired points in which were welded the flanged fittings for line connections. A supporting stand for elevation of the scrubber was fabricated from scrap pieces of angle iron.

### Gas Scrubber Rings Replaced

Another old gas scrubber was rebuilt (Fig. 6). This is 20 ft. high, comprising five 4-ft. rings, and 3 ft. in diameter. The top four rings (16 ft.) were found to be corroded on the inside to a point the walls were considered too thin for further use with safety. The bottom ring and skirt

*(Continued on Page 69)*

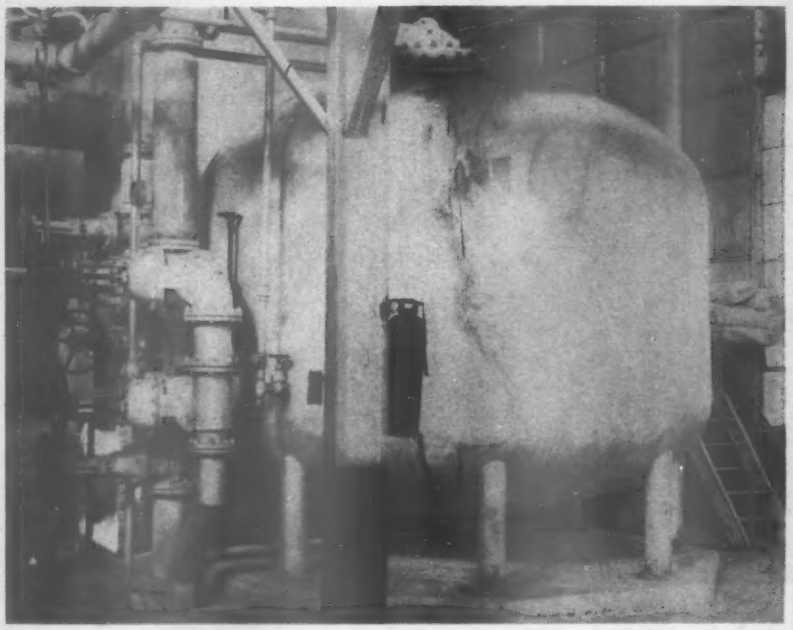
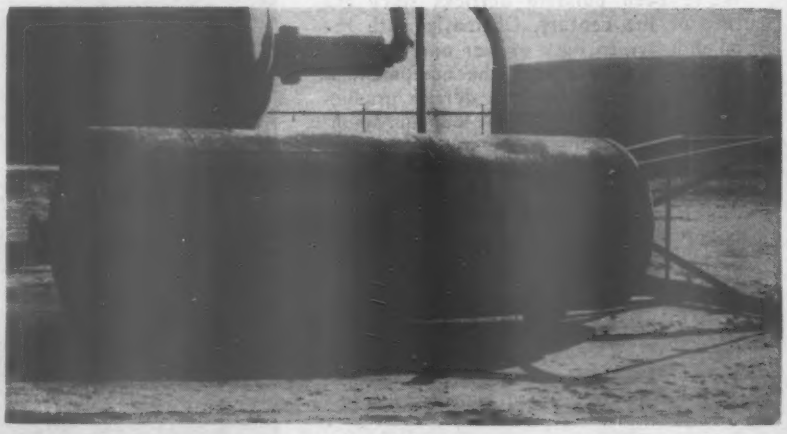
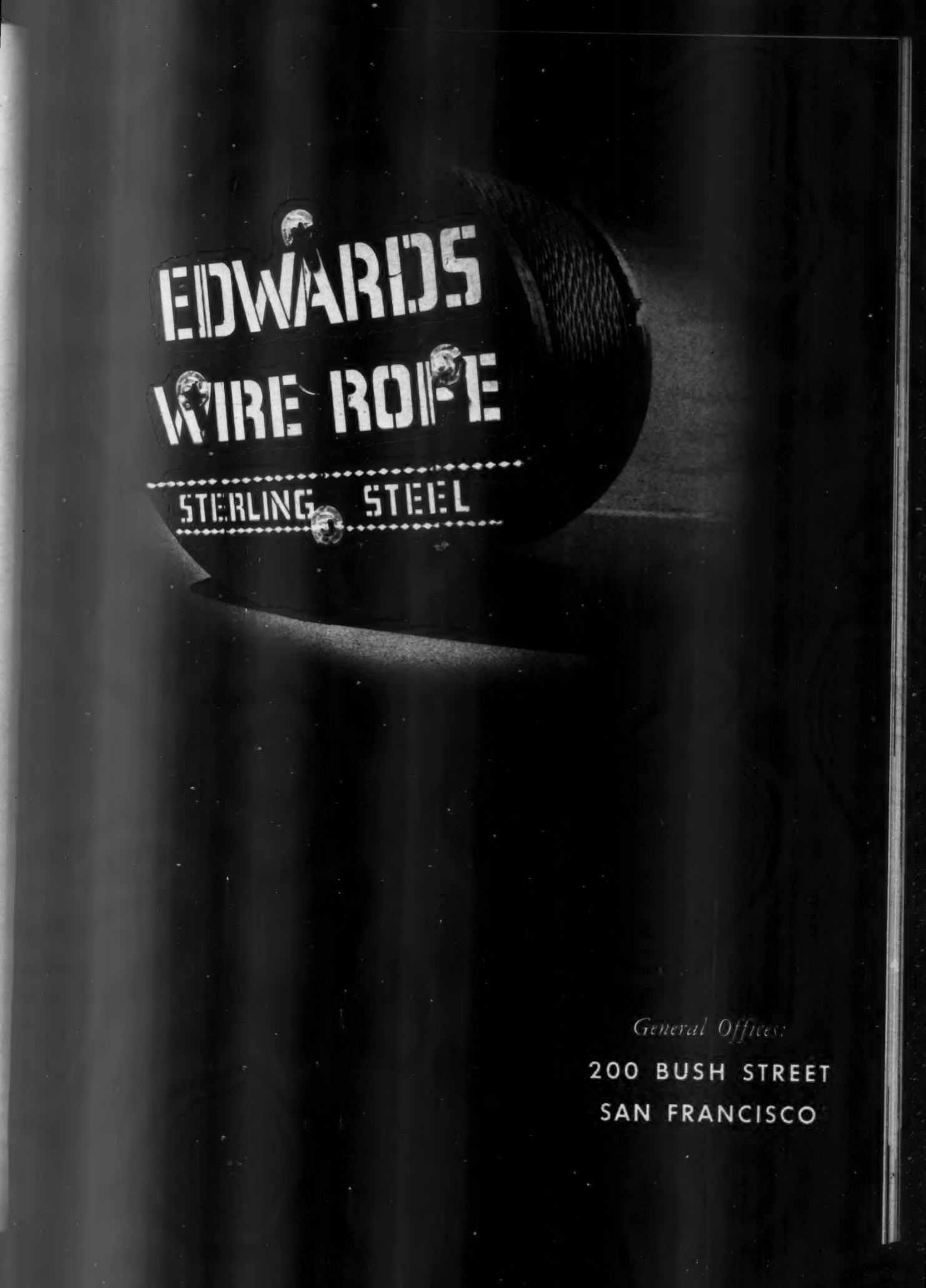


*Fig. 4 (above)—Water filter built from salvaged top section of 11 1/2-ft. diameter fractionating column shown in Fig. 1. Fig. 5 (below)—Scrubber fabricated from discarded stripper formerly in high-pressure and high-temperature service*



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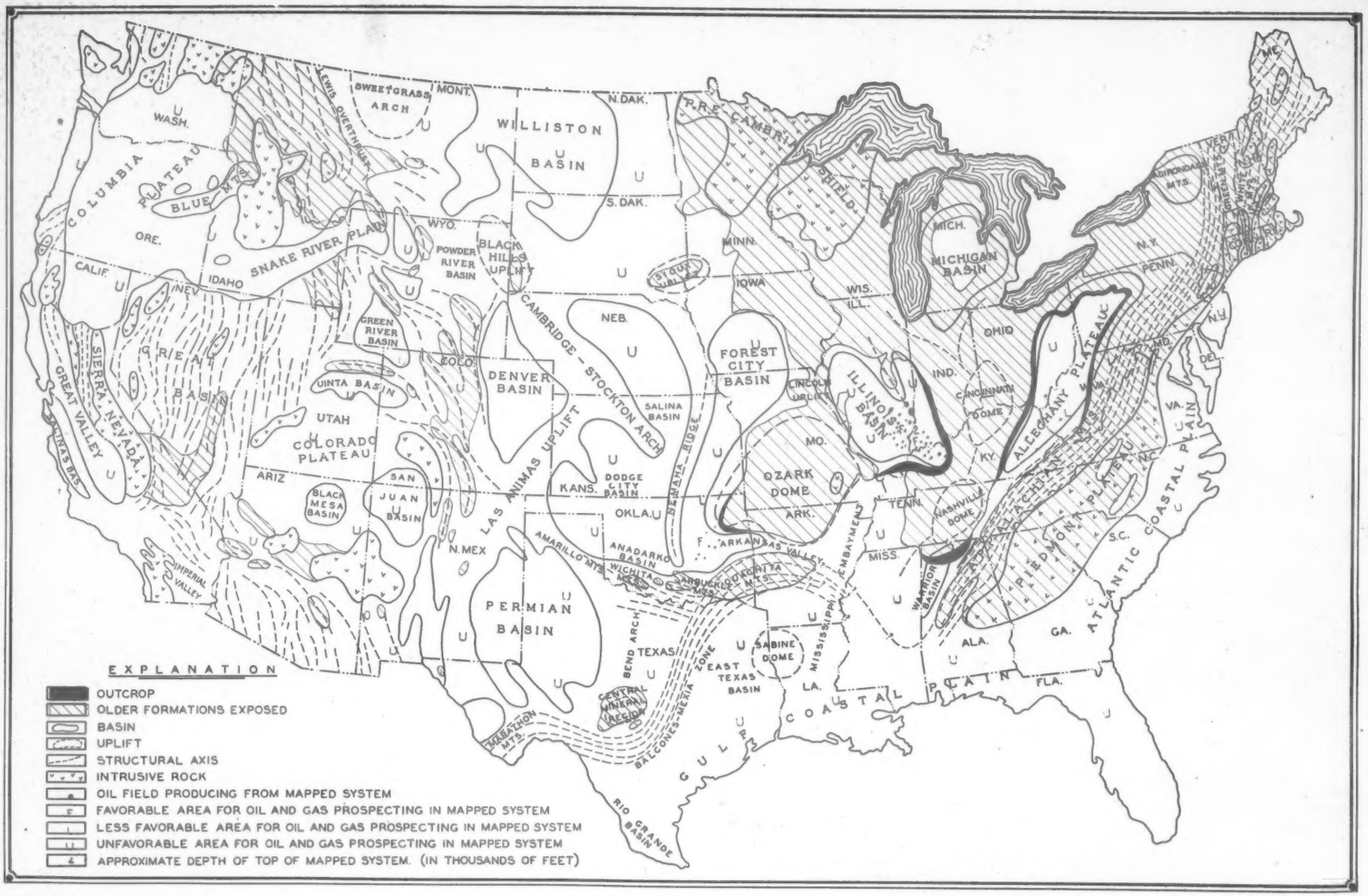
# Upper Mississippian



# OIL ZONES OF THE UNITED STATES

## Upper Mississippian

(Compiled by The Oil and Gas Journal)

**PRINCIPAL PRODUCING HORIZONS:**
Sandstones: Maxton; Chester (Aux Vases, Bethel, Cypress, etc).

**DISTRIBUTION OF PRODUCING HORIZONS:** Upper Pennsylvania production is restricted to three areas and is important only in one, the Illinois basin. The **Maxton sand** produces small quantities of oil in the Allegheny Plateau region where the basin which started to fill during the Ordovician had become almost completely filled. Subsequent activity in this area consisted mainly of the deposition of sands and shales with oscillatory conditions which converted large sections of the basin into swamps in which coal beds accumulated.

In the Illinois basin, a more variegated section of clastics and some limestones were deposited to form the Chester series. Deposition of these formations gradually became restricted to the deeper parts of the basin where sands in the upper members formed wedge-edges. The producing stratigraphic traps in the lower members are, of course, nearer the edges of the basin. Beginning at the top, the pays are as follows:

**Degonia, Clore and Palestine sandstones**—Wabash River area.

**Waltersburg and Tar Springs sandstones**—covering a wider area in the southern part of the basin where they form the principal Chester pays.

**Hardinsburg and Golconda sandstone** — minor pays.

**Cypress** (Weiler, Carlyle, Kirkwood, etc.) **sandstone**—one of the most extensive pays in the Chester series, generally productive in the northern part of the basin.

**Paint Creek formation**—Originally considered a stray sand at Louden but now productive in several fields.

**Bethel** (Benoist) **sandstone**—one of the more important Chester pays which is also widely distributed.

**Aux Vases sandstone**—this pay was originally thought to be noncommercial but has proved to be a good and long-lived producer.

These formations have been more carefully correlated in the Illinois basin than any similar series elsewhere in the country and the type of production of which they are an example is discussed more in detail below.

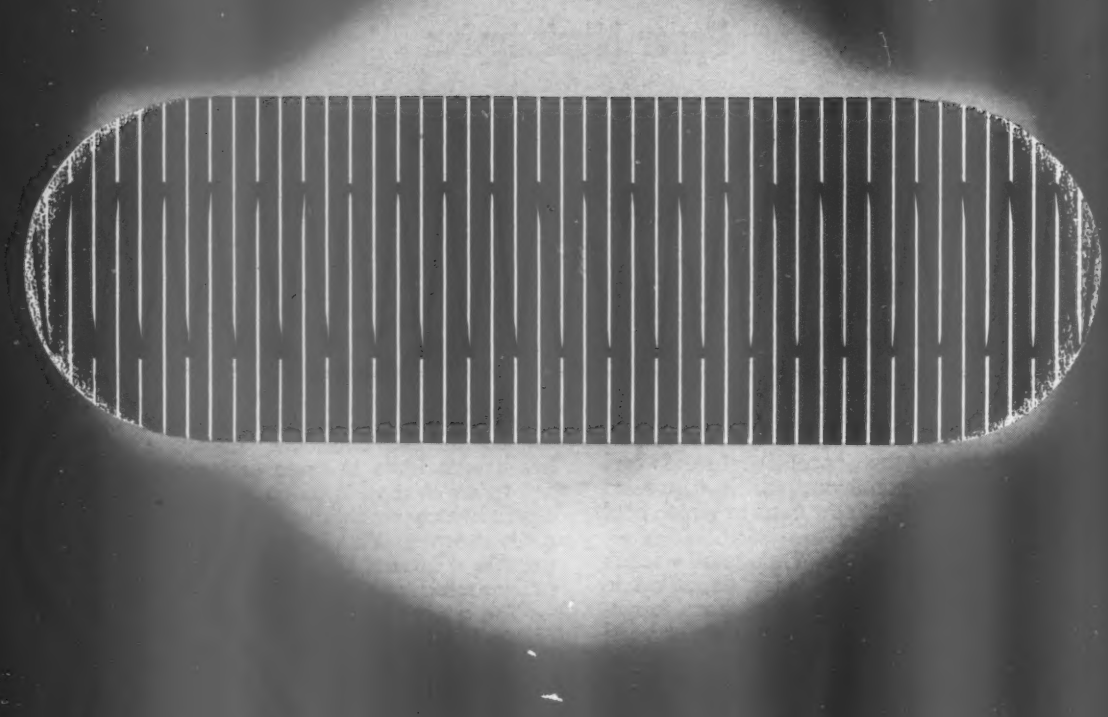
**EXTENSION INTO OTHER AREAS:** Conditions similar to those in the Illinois basin do not appear to have existed at this time in any other part of the country. Other elevations, such as the Ouachitas and Arbuckle-Wichita belt of folding appear to have been lower so that thick shale series without the interbedded sandstones were laid down around them. There is, therefore, no area in which prospecting for production in sediments of Chester age appears to be particularly favorable, the best being around the south end of the Nashville dome.

**GENERAL GEOLOGICAL CONSIDERATIONS:** The local uplifts which became more intense in the upper Mississippian than in previous periods intensified the local variations between formations so that even different parts of the same basin present widely differing conditions. Thus, the alternation of sands and impervious beds in more or less continuous sheets extending over wide areas became an alternation of sands which pinch outward updip and grade into shale downdip. This is the typical depositional stratigraphic trap as distinguished from the erosional stratigraphic trap in limestone formations.

The confusion resulting from improper correlation of similar formations in Oklahoma contrasted with the uniformity of correlations found in the Illinois basin is a tribute to the careful geological work done in the latter area. This has paid dividends in enabling operators to know their exact position in the section, to evaluate their chances of finding other sands in drilling deeper, to know within a few feet the distance to those sands and finally to introduce economies in production through multiple completion of wells. As a result of this geological work, operators in Illinois are able to test all potential pays on a structure without the risk of missing two or three because of a tendency to call any good sand "Benoist" whether it is related to the Benoist or not. Older operators will remember the large number of "Bartlesville" sands in Oklahoma.

Depositional stratigraphic traps may be sought along trends bounded by the shore-line updip and by the line of gradation into shale downdip. Where these porosity trends are intersected by lines of folding they have the best chances for production. Prospecting for stratigraphic traps, in the light of our present knowledge requires the careful correlation of detailed subsurface geological methods with the most refined geophysical prospecting methods.

Depositional stratigraphic traps of the Illinois Chester type may be expected in every basin, not only around the margins but deep in the basins as well. As was seen in Illinois, the lower members of the Chester tend to produce around the margins of the basin and the higher formations within the basin proper. The cycle is not always a simple one, however. Oscillations of the shore line at the beginning of a period of basin filling may be expected around the margin. As the basin fills, the stratigraphic traps approach the middle but at any time the cycle may be interrupted by a greater submergence than usual and the new traps may overlap even the first ones formed.



The *timing mechanism* of all S S C operated domestic seismograph equipment is checked, by long distance telephone circuits, semi-monthly with a master chronometer in its Tulsa laboratories.

These tests assure a uniform and continuous standard of *accuracy* well in excess of the minimum requirements for reliable seismograph results. They are only one example of the careful supervision given S S C's instruments and field equipment.

naturally were in good condition so it was decided to save this in replacing the scrubber. As there was nothing else available around the plant that could be used for the scrubber it was necessary to replace the corroded rings with new materials. For this only plate metal in flat sheets which were rolled in a local mill could be obtained readily. These were then welded together to form a new top section for the scrubber. With the corroded rings cut off, the new section then was set up and welded onto the top of the basal ring of the scrubber which was not removed from its base.

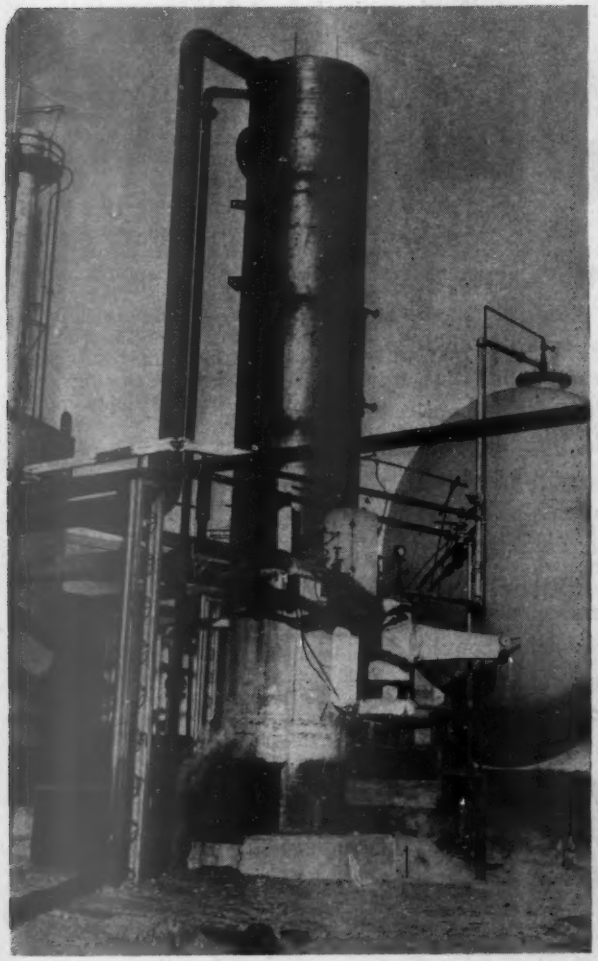
### Stripper Becomes Debutanizer

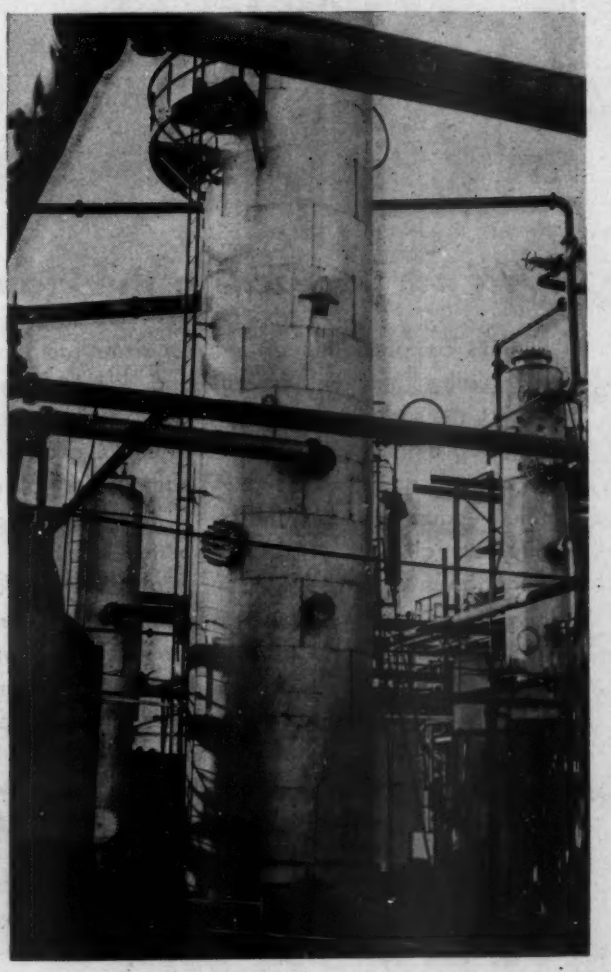
In another case, a vapor separator, formerly used in hot oil service, was moved to a stabilizing unit in another part of the plant and converted into a debutanizer column (Fig. 7). Diameter of the column is approximately 6 ft. Corrosion had reduced the thickness of the walls from ½ to about ¼ in., making it unsafe for further hot oil duty. In use as a debutanizer, it is called upon to operate at substantially lower pressures and temperatures, for which the thickness of the metal remaining is sufficient. Old openings were capped, and new fittings and connections provided to meet the different requirements. Nine bubble trays and caps were bought new and installed.

A dryer for the air used in operation of instruments also was built in the plant shop (Fig. 8). This contains two units, each fabricated from a section of 20-in. pipe, serving as containers for the calcium chloride used as the drying agent and through which the air is passed. The bottom ends to the pipe sections, set up vertically on short legs, were closed by swaging the walls to a central point and welding. The top ends were fitted with flanged covers for filling with calcium chloride. Openings were provided through the top covers for the outlet air lines. Side openings also were cut near the bottom of the units and equipped with flanged covers to permit cleaning. One unit is operated at a time, allowing for replacing the calcium chloride in the other while not in use.

*Fig. 8—Home-made drier for instrument air built from sections of 20-in. pipe*

*Fig. 6 (left, below)—Gas scrubber, upper four rings of which were replaced using flat plate metal rolled in local mill. Fig. 7 (right, below)—Debutanizing column converted from former vapor separator used in hot-oil service*





# PROGRESS IN METALS

**by W. L. Nelson**

## Oils for Blackened Steels

*Abstracts: Parker and Graham, Metal Finishing, Vol. 40, July 1942, pp. 363-367. Taken from Metals & Alloys of October 1942.*

Oil films are extensively employed over phosphatic and oxide coatings on steel for supplemental protection. In such applications the protective value of the coating is of a relatively low order compared to that afforded by the oil film. The protective value of the coating plus oil film exceeds in magnitude the sum of the protection obtained by the coating and oil film when applied individually to the same steel.

In this research, comparative salt spray data were obtained on the protective value of various oils, using steel panels uniformly coated with black oxide. The panels were cleaned and treated in "Jetal" baths, dried, and coated with the oil to be tested.

Results are reported on 19 oils of four types as follows: (1) Straight mineral oil, (2) fatty acid type oils, (3) antitrust compounds of the Stoddard solvent type, (4) water soluble oils. The water soluble oils were employed as water emulsions at 180° F., using 50 per cent oil by volume in the mixtures. Sample panels after oiling were allowed to drain and dry either 24 hours or over night.

The results in general showed mineral oils to be least effective and the better soluble oils to be most effective. A straight mineral oil gave slight rust in 2 hours, different solvent antirust types in from 18 to 42 hours, and soluble oils in from 37.5 to 300 hours. The latter type of oil possesses other advantages. The film produced may be widely varied by varying the proportions of oil and water in the mixture, though the thinner coatings obtained from the more dilute emulsions give less protection.

There is no fire hazard with these oils. The work may be transferred directly from the last rinse to the hot emulsion. The hot emulsion may also be applied by spraying. Dragout losses are less costly because of the high percentage of water in the mixtures. The soluble oils generally cost less than other types. The films obtained with this type of oil may be either oily or mildly greasy.

Soluble oils are being successfully and economically employed for protecting various oxide coated parts during assembly, inspection, and storage. They are being used very satisfactorily for permanent protection of oxide coated parts or enclosed assemblies of instruments and dial gages. In certain cases they are applied without dilution as slushing compounds.

## Case Hardening High-Speed Steels

Although regular and low-alloy carbon steels have been case-hardened for many years, the surface hardening of high-speed steels is a newer development. Many machine tools such as taps, hobs, drills, milling cutters, forming tools, slotting saws, reamers, etc., are constructed of high-speed steel which can operate at a red heat (1,025°-1,050° F.) without softening or losing its cutting edge. High-speed steel permits the production of the tool to mount to numbers of finished objects that are far greater than what can be accomplished by regular high-carbon steel tools.

In 1936 a new case-hardening bath material, known as Holden Hy-Speed

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In Plomb's complete line of supreme quality hand tools for all industries, the socket and attachment group alone includes hundreds of kinds and sizes. Equally complete—equally outstanding in quality—are all other types of tools that bear the famous Plomb name. * Their excellence has made them the choice of professional mechanics—has resulted in such gigantic demand that 36 separate factories operate night and day to fill war needs. Thus, Plomb tools in ever-increasing volume are available thru dependable dealers all over the country to help make weapons faster and better—and to maintain those weapons at peak efficiency. * In addition, if you need special tools for special war production consult Plomb. And remember, for regular tools call your local Plomb dealer.

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Case was introduced to the metal industry. The life of many tools can be increased by 100 per cent or more according to the A. F. Holden Co. of New Haven, Conn., who offer the material along with a suitable treating-bath equipment. The increased life of some tools is said to be as follows:

**SECONDARY HARDENING**

| | Pieces | |
|---|---|---|
| | Before | After |
| Hollow milling cutter ..... | 6,000 | 12,000 |
| Spot facing cutter ..... | 700 | 2,550 |
| Counterbore ..... | 600 | 4,000 |
| Reaming holes on motor blocks ..... | 4,000 | 55,000 |

The material melts at 850°-950° F. and the time of emersion of the tool ranges from 10-20 minutes for small ones and 30-90 minutes for large ones. The normal temperature of treatment is 1,025°-1,050° F. for all types of high-speed (18-4-1 molybdenum or cobalt types) except steels of high-carbon, high-chrome analysis which are treated at 950°-1,000° F.

No mention is made by the Holden company of the hardening of oil-well bits or cutter wheels but it would seem that the method or some modification of the method or material might be useful for this purpose.

## Welding Terms

### Flux

The American Welding Society defines "flux" as a fusible material or gas used to dissolve and/or prevent the formation of oxides, nitrides or other undesirable inclusions formed in welding.

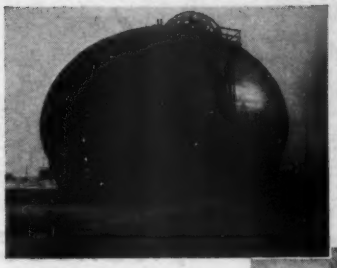
Common fluxes are borax and rosin. In the main, the flux excludes air from the weld by melting and covering the hot metal.

●

## Correction

In the article, "Some Uses of Infra-Red Spectroscopy for Hydrocarbon Analysis," which appeared in the issue of April 1, the author, R. Robert Brattain, was incorrectly identified with Shell Oil Co., Inc. Mr. Brattain is with Shell Development Co. In Table 1 the heading over the last four columns should have read "Low-Temperature Distillation" instead of "Low-Temperature Distillate." Equation (2), second number, should have read "$\log_{10} \frac{1}{T}$" instead of "$\log_{10} \frac{I}{T}$."

The original article included an introduction which reviewed previous research in the field and contained some bibliographical references which did not appear in the article as printed.

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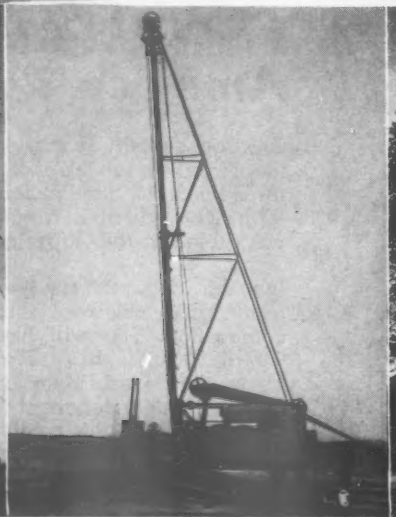

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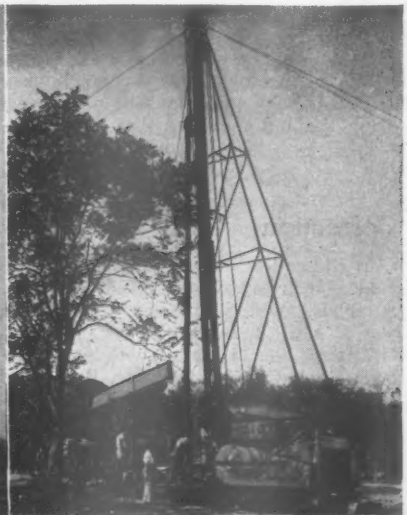

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# ABSTRACTS

## of papers presented before the spring meeting of petroleum section, A.I.M.E., Dallas, Tex., May 7-8

**ELASTICITY OF RESERVOIR ROCKS AND FLUIDS WITH SPECIAL REFERENCE TO THE EAST TEXAS OIL FIELD. David Donoghue, Consulting Geologist, Fort Worth, Tex.**

IT may be said that the point overlooked or minimized in some of the papers on this subject is that the pressure decline, due to the removal of oil, gas, and water from the reservoir, extends out into the water-saturated zone west of the East Texas field and the influence of a small pressure decline upon the large volume of water, sand, clay, and shale in the Woodbine formation causes the movement of water in substantial volume into the relatively low-pressure oil-saturated zone. This movement of the water is a direct effect of the expansion of the water and the reduction of porosity of the reservoir rock, which phenomena are a result of the pressure decline incident to the removal of oil from the immediate vicinity of the oil-water contact, through wells to the surface and by drainage towards areas of relatively low pressure, and the consequent extension of the pressure gradient into the water-saturated zone. Other factors may enter into and complicate the problem. A pressure decline that would have full effect on the expansion of the fluids may not be fully effective in the compaction of the reservoir rock.

In the East Texas basin for a distance of 30 miles north, west, and south from the edge of the East Texas field, the Woodbine formation has an average thickness of 500 ft., of which 50 per cent is sand with a porosity of 25 per cent, and 50 per cent is shale and clay with a porosity of 10 per cent. The "effective" thickness is taken at 300 ft. of Woodbine formation containing 2,000 bbl. of water per acre-foot.

The expansion of the Woodbine water is 1/3500 in volume per 100 lb./in.$^2$ of pressure decline; therefore, an acre-foot of "effective" sand expels 0.57 bbl. of water as a result of this expansion.

The compaction (decrease in porosity) of the Woodbine sand is 45/1000 of 1 per cent per 100 lb./in.$^2$ of pressure decline; therefore, an acre-foot of "effective" sand expels 0.9 bbl. of water as a result of this compaction.

Apparently then 1.47 bbl. of water moves into the oil-bearing zone from the water-saturated zone from each acre-foot of "effective" sand for each 100 lb./in.$^2$ pressure decline.

The pressure decline as of January 1943, in the western part of the East Texas field has been approximately 550 lb./in.$^2$ and the pressure gradient decreases westerly from the field until at some distance the pressure has not been affected by production of oil and gas in the East Texas field. The average pressure decline of 275 lb. over such area would yield 770,000 bbl. of water per square mile by compaction of the sand and expansion of the water.

If these assumptions and approximations are fairly accurate, it would appear that an area extending 30 miles more or less out into the basin north, west, and south from the field would yield sufficient water from the Woodbine formation alone to replace wholly or in large part the 1,850,000,000 bbl. of oil and the gas and the water produced to the end of the year 1942. It should also be apparent that in the East Texas oil field, oil and gas production, reservoir pressure decline, expansion of the gas, oil, and water and compaction of the rocks are complementary phenomena and that "water drive," whatever it may be, needs a definition.

**THE EFFECT OF WATER ON THE STABILITY OF GASOLINE MOTOR FUELS IN STORAGE. Harry H. Power and Fraser H. Allen, University of Texas.**

THE possible deterioration of 100-octane fuels has brought renewed interest in the factors affecting storage stability, particularly, for extended periods under adverse conditions, in remote parts of the world.

Most gasoline is stored in contact with water since it is extremely difficult to prepare and maintain an absolutely dry stock in plant scale operations. Water is often introduced intentionally into storage tanks for various purposes: (1) To float the oil from tank to tank; (2) to raise or lower the oil level to the zero gage mark in certain tanks; (3) to prevent oil leakage from tank bottoms by maintaining a minimum water level; and (4) to detect leaks where light stocks might escape from tank bottoms unnoticed due to evaporation.

The deterioration of certain gasolines in storage is characterized by the formation of gum, haze, darkening in color, and loss of antiknock values. Degradation is particularly emphasized in motor blends of thermally cracked gasolines containing conjugate diolefins. All of these forms of deterioration proceed simultaneously, although they are not necessarily related. Obviously, autooxidation requires access of the gasoline to oxygen or air, but may proceed very slowly in the absence of light, which is the usual storage condition. Deterioration is strongly photocatalyzed by ordinary daylight.

Tests on the deterioration of intensively dried gasolines, as compared with gasoline containing dissolved water, indicate that water is detrimental to storage stability. It was also found that the deterioration of gasoline which was in contact with a water phase containing dissolved air resulted in the extremely rapid formation of gum and peroxides in gasoline. These two observations lead to the following classification of gasoline storage conditions in the order of increasing severity.

A. The storage of artificially dried gasoline under maintained conditions of absolute dryness.

B. The storage of water-saturated gasoline over a water phase which contains no dissolved air.

C. The storage of water-saturated gasoline in the absence of a water phase.

D. The storage of water-saturated gasoline over a water phase which contains dissolved air.

The effect of air above the gasoline, or the presence of a natural or artificial inhibitor in the gasoline, will not affect the relative order of the four classifications of gasoline-storage conditions. The best practical condition of gasoline storage is in "contact" with an air-free water phase.

**THE SELECTIVE ADSORPTION OF HYDROCARBON AND WATER VAPOR ON ALUMINA AT ATMOSPHERIC PRESSURE. Chen Chun Ku, Southern Natural Gas Co., University of Oklahoma Research Institute; R. L. Huntington, University of Oklahoma; and L. S. Reid, Southern Natural Gas Co.**

GAS produced at high pressures is saturated with water vapor when it leaves the reservoir usually along with liquid hydrocarbons. Unless dehydrated the gas must be held at a relatively high temperature to prevent hydrate formation. Minimum safe operating temperatures range from 55° to 90° F. for pressures ranging from 500 to 3,000 lb. per sq. in., respectively. The presence or the need for lower operating temper-

*(Continued on Page 77)*

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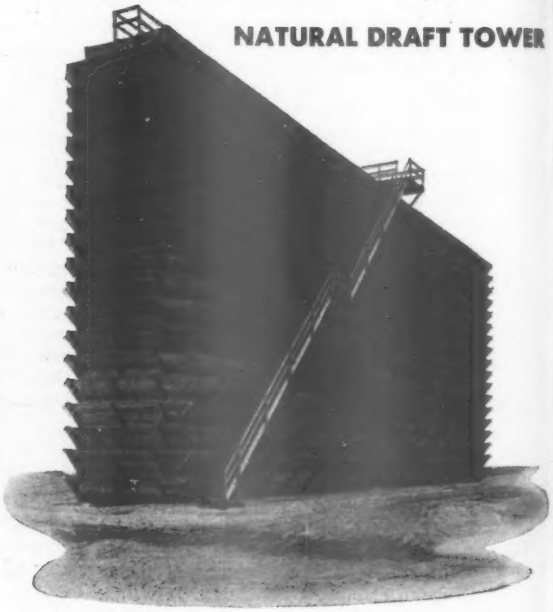
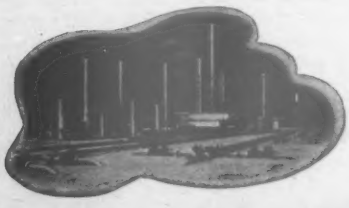


The Tower which should be used where space is economically available, where wind velocities are sufficiently high, and where greater wind blown water loss at high wind velocities is not a criterion. Obviously, wind blown water loss can be more nearly eliminated in mechanical draft towers in which wind velocity is constant than in atmospheric towers subject to great fluctuation in wind velocity.



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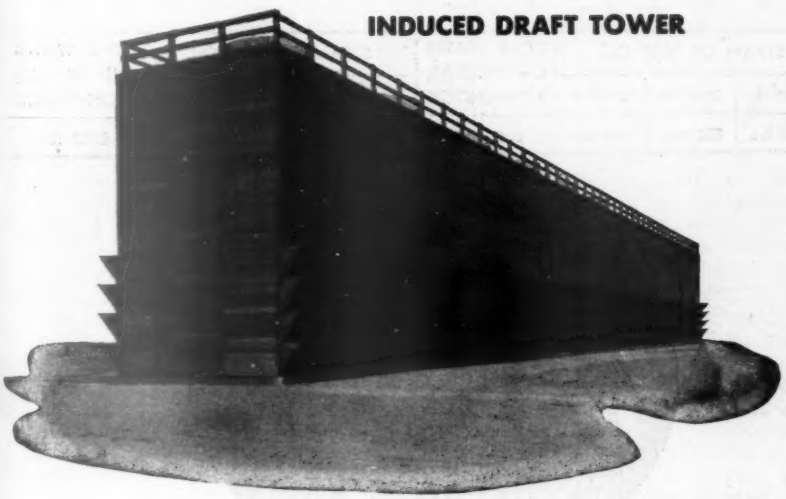

A type of mechanical draft tower alternate to the forced draft type. The tests mentioned at right were conducted on this type of tower, but some of the features proven or developed during the tests have been applied to all three types of towers.

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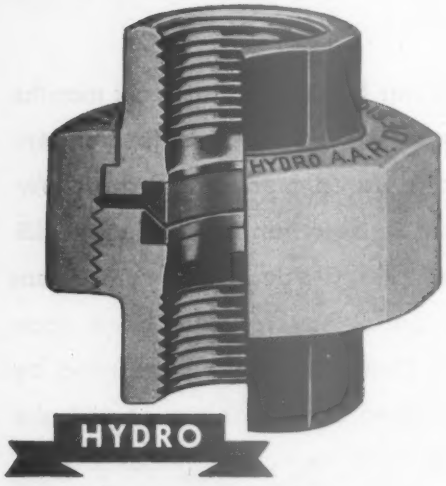


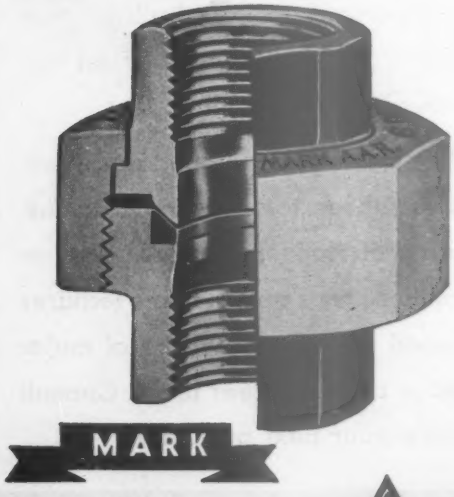


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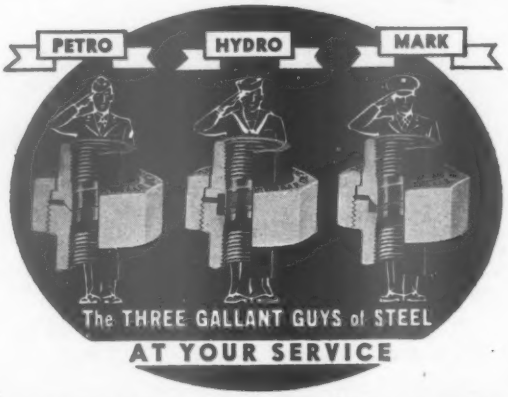


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# CONTINENTAL

atures makes it highly essential that the gas be dehydrated.

The criterion of good dehydration is the dew-point depression. Twice as much water must be removed from 1,000 standard cu. ft. of gas processed at 500 lb. per sq. in. as would have to be removed from the same amount of gas processed at 1,000 lb. to lower the dew point from 80° to 30° F. Increasing vaporization of diethylene glycol at pressures around 1,000 lb. makes it use prohibitive and solid adsorbents have been used, the most successful to date being activated alumina. High pressures have comparatively little effect on its dehydrating qualities and the dew-point depression ranges from 80° to 100° F. whereas diethylene glycol obtains an average depression of 45° to 55° F.

Research reported on here was inspired by an observation of the operation of the Southern Natural Gas Co. plant at Logansport, La., which processes 100,000,000 cu. ft. per day at 1,200 lb. per sq. in. There are four 3-ft. by 28-ft. towers operated in parallel so that two may be regenerated by gas at 390° F. while the other two are working. The regenerating gas is then stripped of the liquid picked up in the dehydrators.

No universally acceptable adsorption theory is possible. Practically all natural gases contain some water vapor along with variable quantities of hydrocarbons including propane and heavier. Solid adsorbents have a definitive adsorptive capacity for a single pure component but this capacity is influenced by the presence of other components in the gas.

It is to be expected that a solid adsorbent would exhibit greater affinity for one chemical compound than another.

The apparatus used in the experiments is described and the chemical and sieve analysis of the adsorbents (which were Florite, Alumina-A and Alumina-H) are given; major constituent of all three is aluminum oxide. Commercial hexane and heptane were used and vapor pressure-temperature curves determined experimentally. Natural gas from the public utility main and city water were used.

A series of runs were made in which all three grades of alumina were completely saturated with water and hexane. The effect of variable composition of inlet gas upon adsorption capacities was obtained by holding water vapor in the inlet gas constant and varying the hexane content. It was found that the ratio of hexane to water adsorbed increases directly with the hexane content and that in the range of 0.1 to 0.7 weight per cent hexane content, Alumina-H shows an advantage over Alumina-A and Florite.

Another series of runs was made in which water and hydrocarbon vapor were held constant and the runs terminated at various stages of saturation. Alumina-H showed a greater adsorptive capacity for both water and hydrocarbon. It was also found that the adsorption cycle is divided into three distinct phases. In the initial stage both water and hydrocarbon are adsorbed, in the second adsorption of water continues but hydrocarbon which has been adsorbed in the first phase is stripped out and in the third phase the adsorbent is completely saturated with both water and hydrocarbon.

Another series of runs showed that the composition of the inlet gas affects the maximum quantity of hydrocarbon adsorbed.

The authors then apply the data obtained to calculate the time interval required for the dew point of the outlet gas in a commercial plant to rise to 32° F., the quantity of gasoline at the end of 12 hours and the quantity of gasoline at the end of 8 hours. The result obtained compare closely with commercial installations.

**NATURAL POTENTIALS IN WELL LOGGING. By W. D. Mounce, Naval Ordnance Laboratory, and W. M. Rust, Jr., Humble Oil & Refining Co.**

OVERSIMPLIFICATION has been the cause for erroneous interpretation of electrical logs but this fact does not reduce the value of the logs.

Normal interpretation is that "kicks" on the logs indicate sands. It not infrequently occurs that some kicks do not indicate sands and the situation becomes serious when it is discovered that a sand, an oil sand, was not indicated by a kick.

The usual theory is that sands are somehow correlated with the potentials. The theory is two-fold, the more popular phase being the "electrofiltration potential." If the natural-potential log were principally the result of electrofiltration, it would be a permeability log; or, if only the electrofiltration potential were affected by changes in pressure, it would be possible to determine the permeability by making two logs at different pressures and observing the differences in the natural-potential logs. Actually, the properties of the filter, which chiefly determines its effect on the electrofiltration potential, are its chemical nature and the condition of its surface. Its permeability has little or no effect. Any correlation between the natural-potential log and permeability is to be explained by the fact that some of the factors that affect the permeability of a sand also directly affect the potential.

Very direct evidence is given by the poor correlation between potential logs in oil wells and measured permeability of cores. If a potential log did measure permeability, it would be the permeability of the filter cake and not the unrelated and much greater permeability of the sand. Experiments both in the laboratory and in the field indicate that even if electrofiltration potential were the only potential that changed with the pressure, it would in this case have accounted for less than 15 per cent of the total potential observed. It is not surprising that correlation between permeability and natural potential is poor, nor remarkable that a sand sometimes fails to make itself noticeable on the potential log.

### Alternate Theory

The second phase of the theory deals with an even more familiar phenomenon—electrochemical potentials resulting from unlike metals in an electrolyte. It will be found that for salts that commonly occur and for concentration differences that are reasonable, the potential is unlikely to be large enough to account for the potentials the electrical log measures.

The theory has a fatal fallacy and that is the method used in obtaining electrical logs. The mud in the well bore is a relatively homogeneous electrolyte. Various potential differences across the contacts in the mud must cause current to flow and to affect the potential log. These potentials have no effect on the log.

It is known that under certain conditions current will flow in a chain of electrolytes. Since energy is dissipated by the flow of a current through materials not perfect conductors, energy must be supplied by some reaction occurring at or near some of the interfaces. This will generally result in a decrease in the potential with time and a lessening of potential has been observed when the section of a well was rerun after a lapse of considerable time.

While studying this problem one of the authors discovered a condition existing in wells under which current will flow in a chain of electrolytes. It gives a qualitative and semiquantitative explanation of some apparently abnormal logs. It explains how a zone of low potential may exist in the middle of a sand which by conventional interpretation would indicate a tight zone, where actual tests show that the permeability is about the same as in the remainder of the sand.

Investigations done on the problem, which included an ingenious testing device, suggest that when fresh water-drilling mud is used, the potential log may be largely a measure of the absence of argillaceous material in the formation. This conclusion is confirmed by the observation that large kicks are often found opposite beds of dense limestone and that most permeable beds which do

not show kicks are found to contain substantial amounts of shaly materials.

**EFFECT OF CERTAIN MICROORGANISMS ON THE INJECTION OF WATER INTO SAND. F. B. Plummer, E. E. Merkt, Jr., H. H. Power, H. J. Sawin, and P. Tapp, University of Texas.**

FOUR types of organisms are present in oil-field waters and appear to play a principal part in producing harmful precipitates. They are iron bacteria, sulfur bacteria, sulfate-reducing bacteria, and blue-green algae.

Many kinds of iron bacteria occur; one of the commonest forms in Texas waters is *Gallionella*. This form is long ribbon-like or tape-like with spiral bands or filaments which are covered with ferric hydroxide excreted by the bacterial cell. They live in slightly acid water containing ferrous compounds and have the ability to precipitate ferric hydroxide in the form of a gelatinous scum.

*Gallionella* appears to develop best in water that has considerable organic matter. It is said to develop best at 9° C. (48° F.); and, therefore, in Texas it multiplies fastest in the winter months. In some places the precipitated ferric hydroxide scum is so thick that a gallon of water will contain a heavy flocculent precipitate filling the lower fourth of the container. The gelatinous scum has the power to clog pores of oil sands badly.

Sulfur bacteria are the most abundant organisms in oil-field waters containing hydrogen sulfide. Four types occur as follows:

1. Colorless, thread-forming bacteria which accumulate sulfur within their cells.

2. Colorless bacteria which do not accumulate sulfur within their cells but produce sulfur abundantly from thiosulfates and hydrogen sulfide outside their cells and grow in the dark.

3. Purple and green anaerobic bacteria which differ from the other two because of their bright pigments and because they grow best in bright light.

4. Minute colorless, anaerobic, nonspore forming, and nonthread forming bacteria, which act primarily upon elementary sulfur and oxidize it rapidly to sulfuric acid.

*Sulfate-reducing bacteria.*—Sulfate-reducing bacteria exemplified by *Microspira* live in the bottom of tanks and ponds where waters containing sulfates are found. They live in fresh, brackish, and salt-water pools and canals. Under anaerobic conditions they rapidly reduce sulfates producing $H_2S$, which reacts immediately with metallic salts to form sulfides, especially black sulfide of iron. The presence of some organic matter which may act as a sort of food appears to be essential for their growth. They thrive at temperatures ranging between 30° and 65° C., but will live in waters up to 80° C.

Their presence is indicated by a black, soup-like, and evil-smelling sludge on the bottom of ponds and tanks.

Sulfur bacterial threads, sulfur precipitates, and sulfide precipitates are effective in clogging sand pores and in hindering the flow of water into a water or oil sand.

**Algae**

Algae are present in warm oil-field waters in great quantities. There are a large number of kinds and varieties, but the forms that appear most active in oil-field waters are the blue-green algae, the *Cycnophyceae*. These are long, featherlike collections of dark, blue-green threads and frondlike aggregations. Each thread is made up of a series of cells which take up $CO_2$ from water containing bicarbonates and precipitates $CaCO_3$ and release free $O_2$. The $CaCO_3$, in the form of a white precipitate, collects beneath the algal mass. Free nascent oxygen in the presence of $H_2S$ in the water appears to precipitate free sulfur which collects in quantities over the gelatinous filaments of the algae, thus retarding growth. Some of the precipitate may be small particles of $CaCO_3$ which are detached from the algal threads along with the sulfur by action of water currents. This combination of sulfur and insoluble $CaCO_3$ precipitate is quite effective in clogging sand cores and in slowing water injection.

*Conclusions.*—Four types of organisms have been found in the waters from Luling and East Texas which change the chemical character of the water and cause precipitates of ferric hydroxide, sulfur, metallic sulfides, and calcium carbonate and produce gelatinous material, chitinous substances, and organic plant threads. These substances separately and collectively have strong clogging effects when water containing them is injected into oil sands as demonstrated by experiments. Results of work in the field and laboratory show that ferric hydroxide can be precipitated easily and filtered out by sand filters, and that the face of oil sands clogged with ferric hydroxide can be cleaned with hydrochloric acid. Experiments indicate that if the porous rock is limestone or calcareous sandstone, care needs to be taken to keep the ferric chloride from penetrating into the limestone.

Experiments also show that algae can be killed easily with small amounts of copper sulfate, and the carbonate precipitates can be removed with hydrochloric acid. Gelatinous algal threads can be dissolved in concentrated sulfuric acid. The sulfur, metallic sulfides, and chitinous material which compose cell walls of some of the organisms are probably the worst clogging material and most difficult to remove. Sulfur bacteria and fungi can be killed by chlorine treatment or by filtering through a filter strongly impregnated with some disinfectant such as a mixture of dichloropropylene and dichloropropane, which has proved effective in destroying soil bacteria. It is doubtful, however, whether the chlorine placed in settling tanks will kill all bacteria or prevent their multiplication and growth in the injection wells and on the face of porous sands.

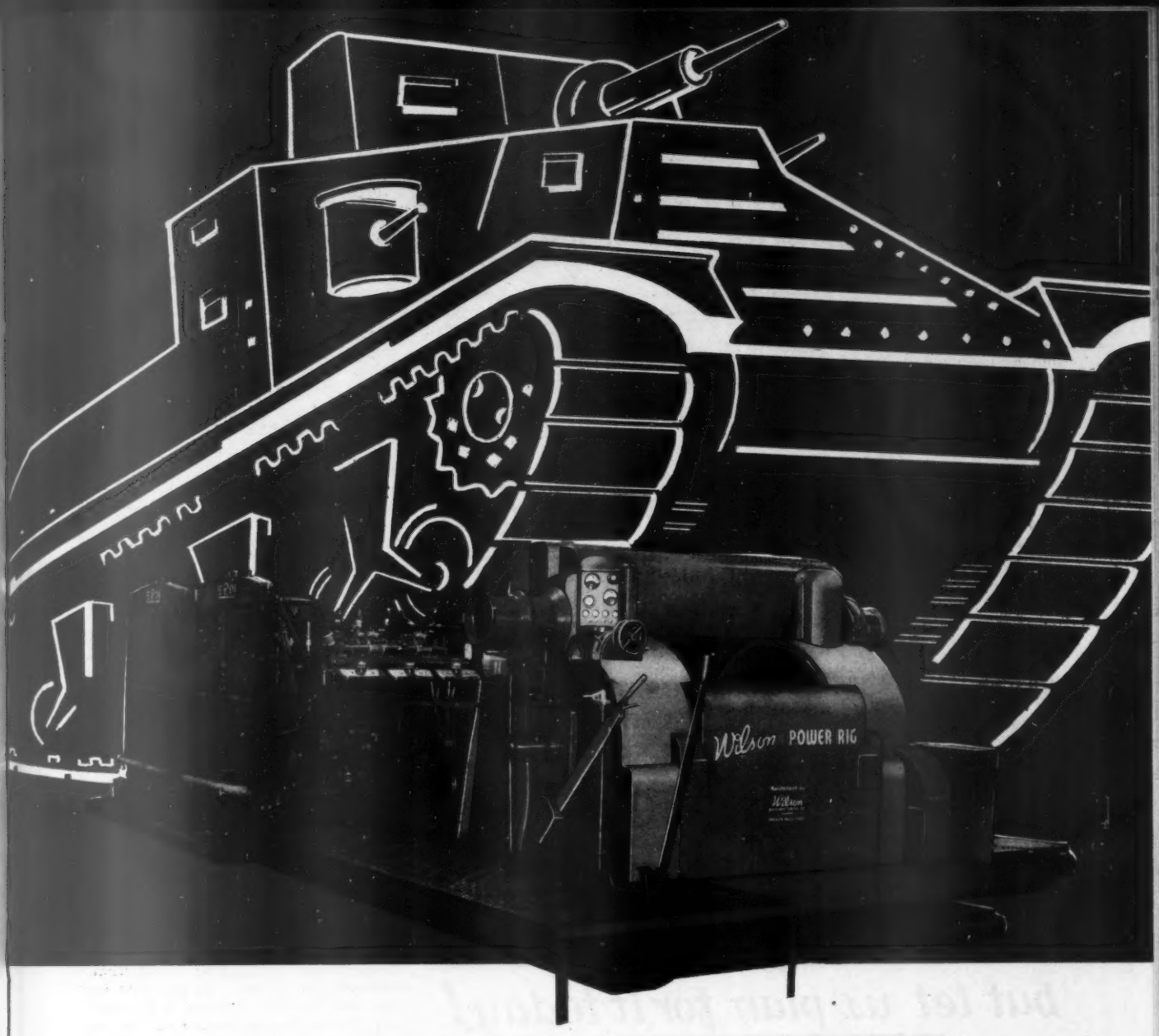
**SURFACE TENSION OF CRUDE OILS CONTAINING DISSOLVED GASES. By D. L. Katz, R. R. Monroe, and R. R. Trainer, University of Michigan.**

A FORMULA for computing the surface tension of hydrocarbon mixtures has been developed based upon recent measurements of surface tension for the methane-propane system. Data on n-butane gasoline mixtures have been used to demonstrate that the formula applies to complex mixtures. Surface tension data on heptane and heavier fractions of the equilibrium liquids containing dissolved gases previously reported, permitted computation of the surface tension for these oil-gas systems at pressures to 8,200 lb. per sq. in. The surface tension for crude oils containing dissolved gases at pressures above 3,000 lb. per sq. in. may be expected to be below 2 or 3 dynes per cm. and may be below 0.1 dyne per cm.

**THE STUDY OF RESERVOIR FLUIDS BY SURFACE RECOMBINATION EXPERIMENTS. H. H. Botset and M. Muskat, Gulf Research & Development Co.**

IN recent years, recognition of the importance of P-V-T data has grown rapidly.* In general these data on reservoir fluids are obtained in either of two ways: by bottom-hole sample analysis or by recombination of fluids as produced at the surface. The apparatus described in the paper for surface recombination experiments was not developed primarily for high accuracy, but rather with a view toward obtaining as much simplicity of construction as possible to afford speed of manipulation, with as good accuracy as these factors would permit. The resulting over-all error for a single experiment is believed to be about 1 to 2 per cent, which is adequate for field use. Greater accuracy may of course be obtained by averaging two or more experiments. It is customary to perform at least two and usually three

*A very thorough presentation of the thermodynamic significance of P-V-T data is given in the recent book by Sage and Lacey, "Volumetric and Phase Behavior of Hydrocarbons."

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check experiments on a given set of samples, thus reducing the probable error.

### Field Sampling

Field sampling is an important operation, for if the samples are not properly taken, the entire experiments are worthless. The oil and gas samples should be taken simultaneously from the separator, preferably at pressures above 100 lb. per sq. in. gage. The well should be flowing under steady conditions. The gas container is a standard 220-cu. ft. oxygen tank evacuated to a pressure less than 1 mm. Hg at the laboratory.

The liquid container is a modified standard small gas tank, 4 in. o.d. and about 14 in. long. Its volumetric capacity is 3 l. Normally this tank has a valve only at one end, but for use as a liquid container, a boss is welded onto the bottom, and is drilled and tapped to take a standard Kerotest oxygen valve.

At the time of sampling, data should be taken on the producing gas-oil ratio. The reservoir temperature should also be known. Separator temperature and pressure should be recorded.

Before shipping the liquid sample, 200-300 ml. of liquid should be bled off to give a small free gas space in the container to take care of temperature changes during shipment.

### Laboratory Procedure

The information obtained from preliminary experiments with the apparatus described in the paper may be used to determine suitable volumes of oil and gas required for flash recombination.

The experiments may be performed with two basic types of recombination ratios: one in which the producing gas-oil ratio is used, and the other in which the actual solution ratio is used.

The volume of separator gas required to give the bubble point liquid or desired gas-oil ratio with the amount of liquid in the bomb, is estimated. Check experiments have shown that the amount of gas actually introduced into the reservoir bomb agrees to within 1 per cent with that calculated.

The ideal P-V-T experiment would be designed to duplicate the pressure-temperature relations of the reservoir fluids throughout their production history. This is impractical for several reasons, the principal one being that we do not know the details of the production history of the fluids; we do not know how nearly isothermal the process is or to what extent the pressure decline-gas evolution is flash or experimental. Therefore, it has been convenient to limit the experimental procedure to an isothermal process and frequently (particularly in the case of bottom-hole samples) results of gas solubility experiments are expressed in terms of residual oil, which is the oil left in the bomb, or sampler, after all the gas has been bled off at reservoir temperature. In actual production, however, as the oil and gas flow up the well, the temperature is decreasing due to the expansion of the oil and gas as the pressure declines. Therefore, since gas solubility in the oil is a function of the temperature, the cooler oil will retain more gas in solution than if its temperature had remained at the reservoir value. To eliminate this extraneous factor of the effect of the temperature of gas evolution on the volume of residual oil, it seems best to express both the gas solubility and expansion factors in terms of stock-tank oil. The latter, of course, also is the unit in which the actual producing gas-oil ratios are measured. To convert in terms of residual oil, in case the latter is desired, a numerical multiplier is used.

Another point to be noted is that the pressure decline during the flow of the gas and oil to surface results in essentially flash liberation of the dissolved gas, whereas the process of gas evolution within the reservoir itself probably approximates more closely that of differential liberation. Now the former will lead to a small-


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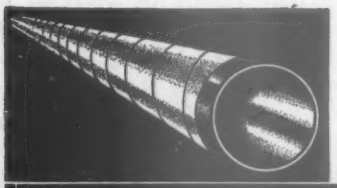

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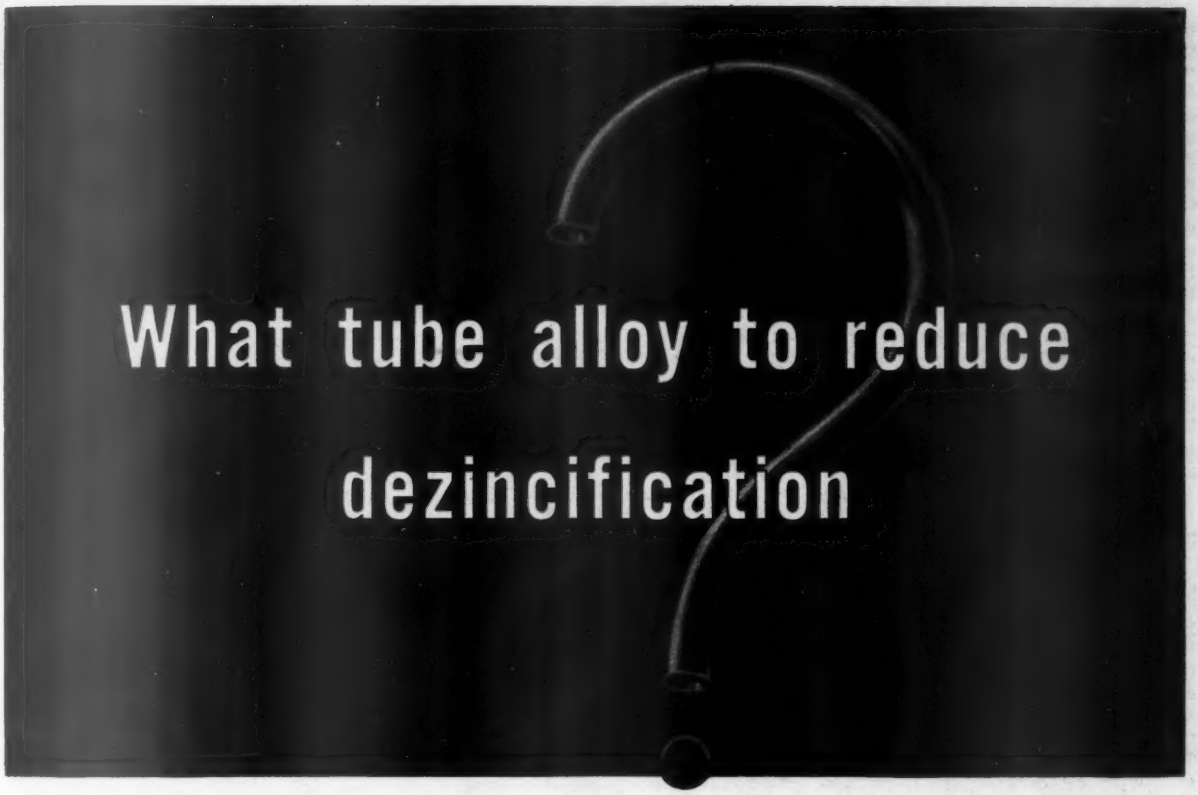


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er volume of residual oil than the latter, while the volume of gas evolved will be greater for flash liberation. Hence the input gas solubility, as determined by the recombination of stock-tank oil and stock-tank gas, and representing the result of a flash recombination, is more representative of the actual solubility of the gas produced at the surface which has been released by flash liberation, than is that obtained by differential liberation of the gas from the saturated oil at reservoir temperature.

Thus the input gas solubility, when compared with the producing gas-oil ratio, will be directly applicable to a calculation of the free gas entering the flow string, if any, or to the determination of the degree of undersaturation of the oil. On the other hand, the curve of differential-liberation gas solubility vs. pressure will apply to the equilibrium conditions within the reservoir itself as its pressure declines.

In most of the recombination experiments the input gas-oil ratio is lower than that obtained by differential liberation. This appears to be in contradiction to the statements above. A consideration of the thermal conditions will explain the difference. The recombination experiment is begun with oil containing all its dissolved gas at room temperature. The separator gas is added and the bomb brought to reservoir conditions. After equilibrium is attained, the gas is bled off at constant reservoir temperature. As the gas solubility will be lower and vapor pressure of the residual oil will be higher at the reservoir temperature the oil sample in the bomb may give off more gas and vapor than the volume of input gas, even though the differential liberation process itself tends to yield less gas than flash liberation. It is clear that the closer the reservoir temperature is to room temperature, the more closely the relative volumes as obtained by flash recombination and differential liberation will approach their proper theoretical relationships.

### Formation Volume Studies

A knowledge of the volume occupied by oil and gas in the reservoir under various conditions has a number of applications in connection with problems of production and in estimating reserves. The term "formation volume" means the volume occupied by unit volume of stock-tank oil (60° F. and 14.7 lb. per sq. in.) and the corresponding amount of gas for a given gas-oil ratio, at the reservoir or any other specified temperature and pressure.

The procedure for determining formation volumes with this apparatus is quite simple. The proper amounts of oil and gas to give a desired gas-oil ratio are introduced into the bomb. The bomb is placed in the constant temperature bath and the pressure is increased. Equilibrium may be reached at any desired pressure. The formation volume of the oil and gas is directly obtained. Usually a series of temperatures is chosen, at each of which the formation volume will be determined for a series of pressures, both ascending and descending. These may be made on the same sample for a fixed gas-oil ratio. After measurements have been completed at the appropriate number of temperatures, a new sample with a different gas-oil ratio is taken and the measurements are repeated. The data thus obtained are tabulated.

### ANALYSIS OF OIL PRODUCTION IN THE NEAR-DEPLETED MEXIA-POWELL FAULT-LINE FIELDS OF TEXAS. H. B. Hill and R. K. Guthrie, U. S. Bureau of Mines.

MEXIA field was discovered in September 1921 with production being obtained at 3,065 to 3,117 ft. and a later and a deeper but less extensive Woodbine pay was uncovered. In December 1921 there were 67 wells in the pool, December 1922 there were 521 and in August 1923 there were 541 wells. Oil production reached a maximum in 1922 when 34,000,000 bbl. was produced; in 1923 production was 18,000,000 bbl.

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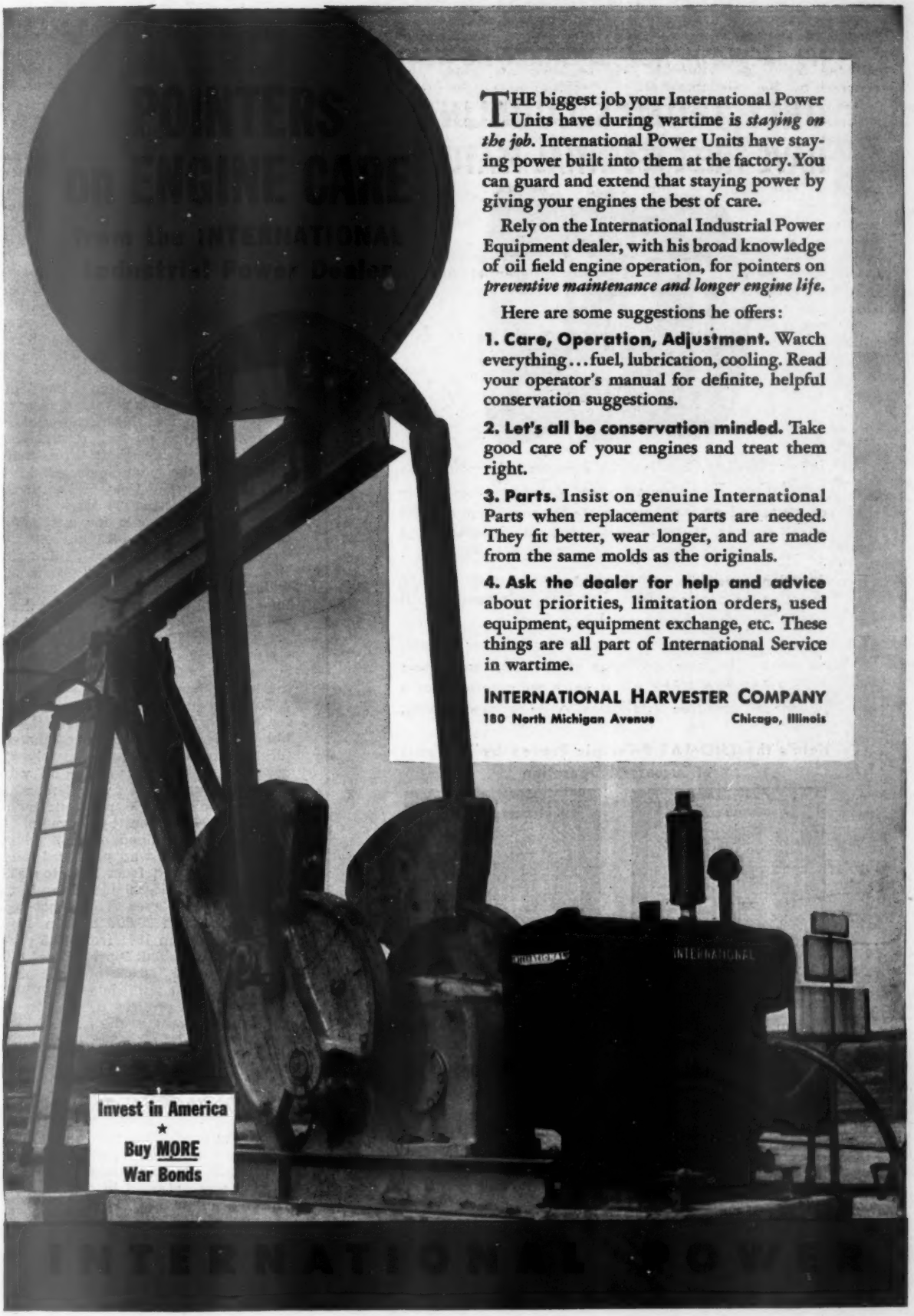


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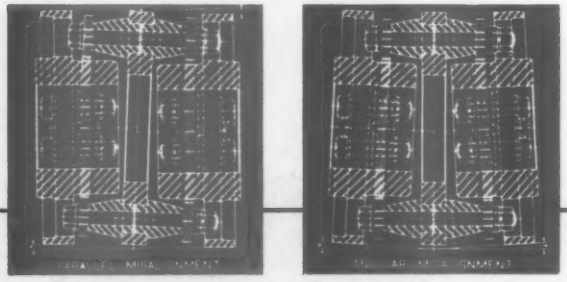

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mated ultimate production was produced during 4¼ years and 87 per cent was recovered in 10 years. Production per well declined rapidly to 1932 where it leveled off at 7 to 8 bbl. Wells nearest the fault were the best producers, averaging 49,179 bbl. per acre, 864 bbl. per acre-foot and 228,900 bbl. per well. This is attributed to a thicker saturated section and a better flushing action by water. Estimated oil recovery for this field is 27,027 bbl. per acre, 676 bbl. per acre-foot and 162,159 bbl. per well. Spacing is one well to 6 acres.

One test drilled in 1941 on an abandoned lease obtained an 11.5 bbl. per day well and another well drilled the same year got 37.8 bbl. per day production; other wells on the lease drilled in 1922 produced 30 bbl. per day.

The Wortham field in Limestone and Freestone counties was discovered in November 1924. The pool is approximately 3 miles long and less than ½ mile wide. First three completions in the pool averaged 6,000 bbl. per day. The field was entirely drilled in 7 months. There were 760 acres with 324 wells for a spacing density of one well to 2.35 acres.

There was a revival of drilling in 1940 and 1941 when 23 new producing wells were completed with a combined initial production of more than 600 bbl. per day, varying from 16 to 121 bbl. per day. Flushing action of water may have produced local accumulations of oil during the producing life of the field.

Total production to January 1, 1942, for the Wortham field was 22,741,106 bbl. or 97 per cent of the estimated ultimate recovery. Approximately 72 per cent of the recoverable oil was produced during the first 13 months of the field's life, 93 per cent by 5 years and 96 per cent by 15 years.

Production declined to 1932 when only 53,883 bbl. was produced and production varied from 1933 to 1939 from 24,000 to 45,000 bbl. from 7 to 15 wells. The delayed drilling boosted production from 29,397 bbl. in 1940 to 159,960 bbl. in 1941 from 21.5 producing wells. About 3 per cent of the field will yield 100,000 bbl. per acre and 54 per cent will yield 20,000 bbl. or less. Most prolific production is obtained adjacent to the fault. Average recovery will be 29,910 bbl. per acre and 70,189 bbl. per well.

### Currie Oil Field

The Currie field in Navarro County, Texas, was discovered in October 1921, with production from the Woodbine sand at 2,994 ft., plugged back from 3,030 ft. Subsequently gas production was obtained in the Morrow sand approximately 225 ft. below the top of the Woodbine but it proved to be only 28 acres in extent with 7 wells where the Woodbine covered 407 acres with 68 wells.

The main Woodbine pay is about 40 ft. in total thickness and is sep-

arated into three members.

Production to January 1942 totaled 6,645,460 bbl. and ultimate production is estimated at 7,000,000 bbl. Peak number of producing wells was in 1924 but the maximum yearly production was in 1922 when 24 wells produced 2,005,012 bbl. In its first 5 years the field produced 77 per cent of its ultimate recovery. The 13 or 14 wells still producing have an output of 7-bbl. average and large volumes of water are lifted and much of the oil now obtained is due to the flushing action of the water. Fluid column is in the wells around 1,800 and 2,000 ft. Average ultimate recovery in the field is 16,000 bbl. per acre. Average spacing is one well to 5.80 acres, acre-foot recovery is 770 bbl. and recovery per well is 93,333 bbl.

### Richland Oil Field

The Richland field in Navarro County, Texas, was discovered in February 1924 with the Woodbine sand topped at 2,977 ft. for an initial production of 350 bbl. per day. Total wells to end of 1924 was 53 and average 4; number producing in 1925 was 87 with the maximum of wells producing at one time being 95. Proven acreage is 234 acres.

Estimated net producing thickness of the Woodbine sand was 19.5 ft. Production to January 1, 1942, totals 6,398,000 bbl. and ultimate recovery will be about 6,500,000 bbl. Approximately 79 per cent of the oil recovered was produced in the first 22½ months and in 5 years the field produced almost 94 per cent of its ultimate recovery.

By 1940 the field had been abandoned but due to new drilling two producing wells were completed and two more in 1941. The field's production for 1941 amounted to 16,065 bbl. and was more than was produced during any of the 14 preceding years.

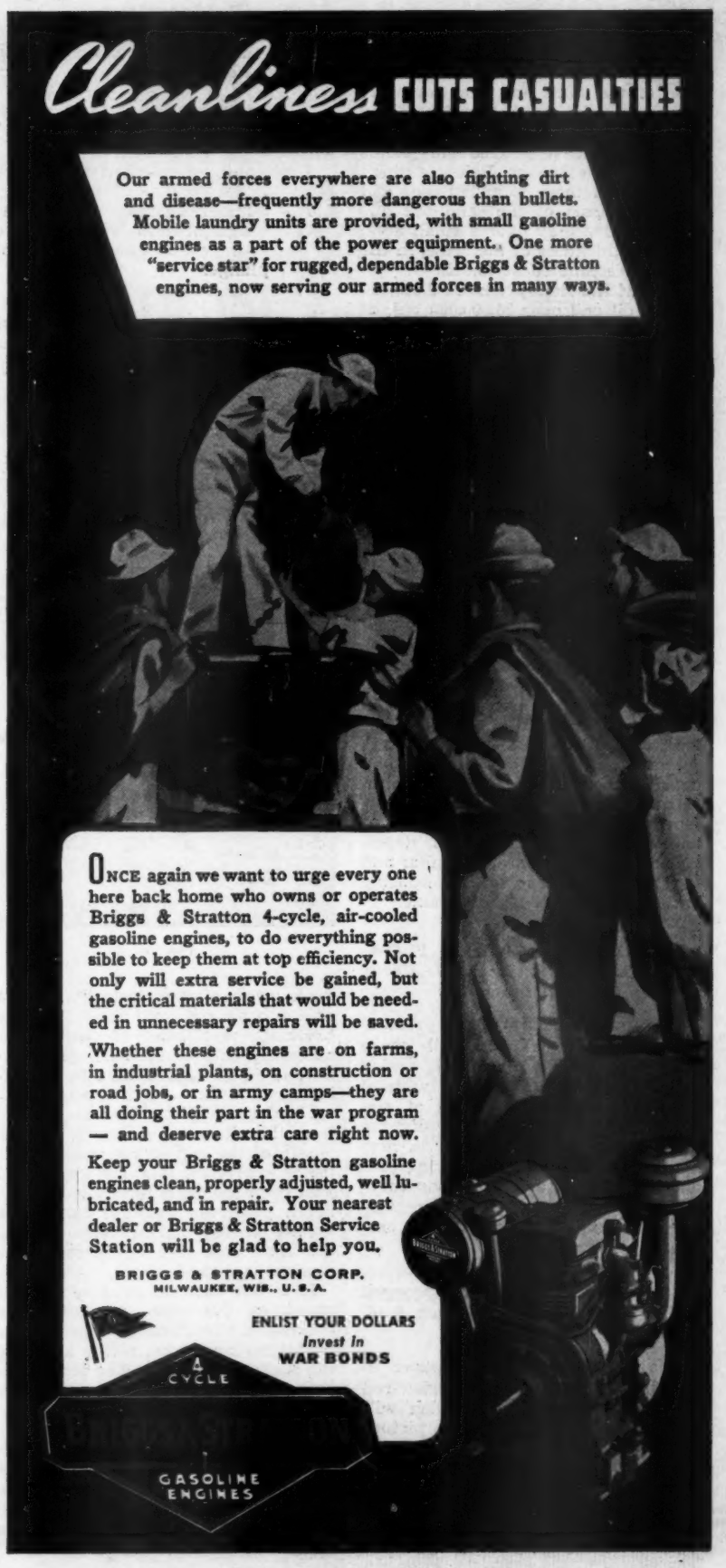
A well density of 2.34 acres, open flow and high water production accounted for a fairly high oil recovery. Ultimate recovery per acre will be 27,771 bbl.; per acre-foot will be 1,383 and per well will be 65,657 bbl.

### Powell Field

The Powell field is also in Navarro County and was discovered in January 1923 with the Woodbine sand being topped at 2,963 ft. for an initial of 400 bbl. per day. The field was drilled up by November 1923 and had a peak production of 365,000 bbl. per day on November 14 but declined to 99,000 bbl. per day by December 15. By January 1, 1924, 591 wells had been drilled and a year later there had been 751 completions in the deep and shallow pays.

Oil-bearing area in the field is approximately 2,600 acres. The field is 7¾ miles long and ¾ mile wide. Accumulation of oil was on the upthrown side of the fault.

In addition to the Woodbine sand,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the shallower Nacatoch and Corsicana sands were developed. The Nacatoch was productive on the west (down) side of the fault and the Corsicana was productive on both sides of the fault. The 60 ft. of Woodbine pay is divided into several producing sands by thin shale breaks. Below a thick shale break there is a "big pay" in the lower part of the sand but this is productive only over a small area. Average thickness of the sands in the field are estimated at 45.6 ft.

In 1924 the field produced 2,000,000 bbl. of oil and over 35,000,000 bbl. of water. The flushing action of the hot salt water is quite efficient.

To January 1, 1942, the field produced 113,803,571 bbl. of oil from the Woodbine and shallower sands. Peak production was in November 1923 when 356,000 bbl. was produced. About 30,000,000 bbl. of oil was produced during the last 8 months of 1923 and in 1924 the output was 33,000,000 bbl. In 1925 the field produced only 17,000,000 bbl. and in 4⅝ years the field produced 83 per cent of its ultimate recovery. The Woodbine will ultimately recover 113,500,000 bbl. and the Corsicana and Nacatoch will get the balance of 117,500,000 bbl.

In ranking the rates of decline in the five fault-line fields, the Wortham field with a well density of one to 2.10 acres declined the most rapidly. Richland with one well to 2.36 acres was second in decline, Powell with a density of one to 3.5 acres was third, Currie with one well to 5.8 acres was fourth and Mexia with a density of one well to 6 acres was fifth. Reservoir characteristics are all similar and development except for the spacing pattern was practically the same.

**PRESSURE BEHAVIOR IN FLOWING OIL WELLS. By L. V. Uhrig. Humble Oil & Refining Co.**

THIS paper illustrates the pressure behavior in flowing oil wells equipped to flow through tubing which is swung in the hole without a tubing packer. Examples of test data are presented which typify the pressure differences effected in normal ratio wells having differing productivity factors and producing varying amounts of water. The pressure effect of a moderate increase in gas-oil ratio is mentioned.

**ANALYSIS OF OPTIMUM SUCKER-ROD PUMPING. D. O. Johnson, S. M. Jones Co.**

IT is the purpose of this paper to select a formula for sucker-rod load and plunger travel which will give a reasonably accurate picture without too much complication and to present charts correlating these data as well as a chart for the selection of the best pump sizes for various production rates and depths.

The following formula for well loads was used because of its simplicity and the fact that it fairly well agrees with calculated loads.

$$P = (W_r + W_o)\left(1 + \frac{LN^2}{70{,}500}\right)$$

where

L = length of polished rod stroke in inches
N = number of strokes per minute
$W_o$ = weight of fluid—fluid pressure at the pump times net area of plunger
$W_r$ = weight of rods in air

In order to facilitate calculations of loads, a chart shown in Fig. 1 was

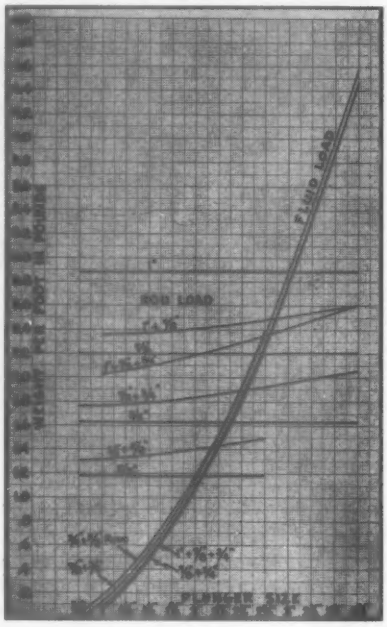


*Fig. 1*

made up showing the weight per foot of depth for rods and fluid. In order to limit the number of calculations necessary only tapered strings of ⅞-in. and ¾-in. rods with a 54-in. polished-rod stroke are first considered.

The deadweight rod load is obtained from this chart and multiplied by the length of the rod string and impulse factor to give the total rod load. Fluid load from the chart multiplied by the depth gives the load for fluid of a specific gravity of 1.00. In calculating the fluid load the net area of the plunger was used.

It is not hard to imagine that as speed of operation increases, the sucker-rod stretch may be turned into useful motion by the spring action of the sucker-rod string. The longer the string of rods, the more stretch is available to be transformed into useful motion of the plunger.

Through the development of a bottom-hole dynagraph actual measurements of plunger motions have been made and these have been correlated with a formula developed by Reiniets and based on the theory of vibrations as presented by Mr. Timoshenko in his text, "Vibration Problems in Engineering." This formula is as follows:

$$S_p = S_s \cos\theta + \frac{Q\beta}{K} = \frac{2W_r}{K} - \frac{F}{K}$$

in which

$S_p$ = plunger stroke in in.
$S_s$ = polished-rod stroke in in.
$W_r$ = weight of fluid on the plunger
$\theta$ = phase angle determined from a chart taken from Timoshenko
K = spring constant of rods, lb./in. of stretch
F = rod friction load, pounds.
$Q = W_r(1 + C) + 2W_rC$
C = acceleration factor
$W_r$ = weight of rods
$\beta$ = magnification factor from a chart from Timoshenko.

All of the factors may be quite easily calculated with the exception of the friction factor and the damping factor. However, the damping factor has been found to be about 0.8 in the big majority of cases.

Calculations were made for plunger travel for various plunger sizes and speeds of operation and a separate set of curves plotted for each pumping depth. The second step was to calculate and plot production curves based on the calculated plunger travel and the third step was to plot the load for each speed and plunger size. Then lines of equal production were superimposed on the load charts. In each of these calculations, the surface stroke was taken as 54-in. and the rod string as a ⅞-in. and ¾-in. taper.

On the basis of this analysis, a table for selection of pump sizes has been prepared, to be used as a general guide. Specific well conditions such as gas interference, excessive friction, abnormally viscous fluid, etc., may necessitate smaller or larger pumps than shown. This resolves itself into an individual well problem, the solution of which requires an individual well study and experimental data.

From these curves and also a consideration of the recommended loading of various types of sucker rods, we can quickly get some idea as to when larger or smaller rods than a ⅞-in. and ¾-in. taper can be used.

If there were no adverse fluid conditions, a schedule of rod sizes to be used at the various depths for each plunger size could be made up.

Considering the effect of changing stroke length we know that a longer slower stroke will give a lower load than a short fast one. However, the slower motion must necessarily give higher torque requirements to transmit the same horsepower.

Calculations can easily be made for loads and plunger travel when the pump sizes for optimum conditions is known. The pump schedule agrees with practice in Oklahoma City, Seminole and Kansas wells, where pumping loads and conditions are severe.

# SAVINGS THROUGH USE OF STAGE SEPARATION

THE production of oil is exceptional in that often the increase in the volume of the produced oil is accompanied by an increase in its value. Most other industries do not have this advantage and frequently an increase in the production means a reduction in quality.

As everyone knows, much oil is purchased on a gravity basis. Generally, although not always, there is a $0.02 differential upward per degree of gravity. Thus in North Central Texas the price of 36° to 36.9° A.P.I. crude is $1.13 per barrel and for 37° to 37.9° it is $1.15 per barrel, etc. If the gravity of the crude can be upped 1° to 2° the value of the oil is increased correspondingly. There are also the borderline cases where the increase of a few tenths of a degree may mean a $0.02 difference in price.

In addition to the increase in value through the increase in price, the oil also actually increases in volume. Roughly, this amounts to about 2.5 per cent per degree of gravity, that is, an increase in gravity of 1° of 100 bbl. of oil results in an increase of volume to 102.5 bbl. of oil.

### Methods

Vaportight tanks, reduction of heat to which the stored oil is subjected, elimination of agitation, reduction in the treating temperature, etc., have all been suggested and are widely used at the present time. Another method which has not been widely applied except in the high-pressure areas is the stage separation of the produced crude.

At the present time, most stage separation is carried on in fields where it is absolutely necessary to recover any appreciable amount of fluid, or in fields where the operation would be practically uneconomic if stage separation were not employed. In only a few fields is stage separation used as a gravity and volume-increasing measure. It could be considered for practically any field requiring an oil-gas separator although its application to pumping wells is limited.

By reducing the pressure on the produced fluid in stages, a considerable portion of the lighter fractions is kept in the crude oil and this accounts for both the gravity increase and the volume increase. The method also reduces the gas-oil ratio of the producing fluid.

Many look on stage separation as a very expensive, or at least an unnecessary procedure, for ordinary production. Actually, the investment is not large, it pays out quite rapidly and the question as to whether it is necessary or not is open to considerable debate.

### Investment

The investment required naturally varies with the particular property involved but if it is assumed that stage separation is to be used in conjunction with a modern tank battery then the only outlay required is for the additional separator, the piping necessary to connect it to the other separator (or separators) and the vent valve and line. The piping, vent valve and lines and the labor necessary for the installation of an additional separator will run in the neighborhood of $250. The cost of various separators along with their oil and gas capacities is shown in the accompanying table. These vary from approximately $400 to approximately $2,960, the latter being for a separator with a 2,000-lb. per sq. in. working pressure, which is one to be used in high-pressure work where stage separation is a necessity.

Assume a lease with four wells making approximately 50 bbl. per day with gas-oil ratio 1,000 cu. ft. per bbl. and a flowing pressure of around 650 lb. per sq. in. Tests show that if a second separator is installed and operated at 100 lb. per sq. in. in conjunction with the present separator at 30 lb. per sq. in., the gravity of the oil will be raised 2° and the volume a little over 5 per cent.

### Separator Cost

From the abbreviated list of separators given, it is apparent that a suitable one can be selected which will require an investment of approximately $1,000 installed. There is no additional labor and very little additional maintenance expense so all that is necessary is to return the $1,000 investment before a profit is made.

On the basis of a gravity increase accompanied by a $0.02 differential, the time required to pay out this additional equipment is roughly 145 days. In cases where the field is strictly prorated and no increase in barrels of produced oil can be obtained, this is the only monetary saving although there could be an allowance made for the reduction in the depletion of the reservoir.

If more oil can be sold from the lease, the payout is reduced appreciably. If instead of selling 200 bbl. per day, there is marketed 210 bbl. per day of the higher-priced oil, added gross revenue is approximately $18.06 per day. The payout then is in the neighborhood of 2 months.

In evaluating such a procedure it may be assumed that the additional revenue is increased profit as none of the expense of the operation is increased.

**TABLE 1**

**Low-Pressure Standard Separators**

| Size | | Working | Price | Capacity | | Pressure |
|---|---|---|---|---|---|---|
| Dia. (in.) | Ht. (ft.) | pressure (lb./in.²) | at factory | Oil | Gas | (lb./in.²) |
| 30 | 10.0 | 125 | $400.10 | 2,300 | 2,465,000 | 30 |
| 36 | 11.0 | 125 | 478.35 | 3,100 | 3,780,000 | 30 |
| 48 | 13.0 | 125 | 714.42 | 5,975 | 7,620,000 | 30 |
| 60 | 16.6 | 150 | 1,219.11 | 13,200 | 13,400,000 | 30 |
| | | | **High-Pressure Separators** | | | |
| 30 | 11.0 | 225 | 818.12 | 2,050 | 9,890,000 | 110 |
| 36 | 16.0 | 480 | 1,015.59 | 3,015 | 12,895,000 | 120 |
| 24 | 11.0 | 1,000 | 1,593.89 | 1,545 | 12,780,000 | 400 |
| 24 | 12.0 | 2,000 | 2,960.84 | 1,710 | 13,500,000 | 500 |

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IT DOESN'T PAY to assume that everybody is too busy to build a vital piece of equipment for you. We're busy, of course. Who isn't?

But—production schedules are hard things to control these days—especially in a business like ours where the types of work we do are so varied. Despite the most careful planning, there are times when some departments get ahead of schedule while others are hard pressed to meet demands. And a week later the situation may be reversed.

Because of this condition, we are sometimes able to accept new orders for early production. Thus, we may be able to immediately handle your requirement. Of course, much would depend upon the CMP allotment this requirement would carry.

Don't take it for granted that you can't get what you need. First, mail us your specifications and prints. We will quote at once and advise you of the earliest possible production and delivery dates. You may be agreeably surprised.

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# ENGINE REPLACEMENT ECONOMICS

A COST - ENGINEERING problem of considerable economic importance frequently arises in connection with a change in type, or replacement, of the prime mover at a pumping installation—and usually the cash outlay involved is great enough to justify a rather thorough engineering investigation.

**Problem.**—The prime mover at Case well No. 1 has been in operation for many years. The maintenance cost of this unit (A) appears excessive and it is proposed that replacement be made with a new Type B unit.

**Mechanical Factors.**—In an engineering investigation of this kind, a consideration of the mechanical factors involved comes first in the order of logical sequence. The horsepower requirement, transmission equipment and type of prime mover are decided upon through calculations based upon the following information:

Present daily production.
Operating cycle.
Operating hours.
Size of tubing and rods.
Make of pump.
Weight of well.
Bore of pump.
Diameter of band wheel.
Pully centers.
Speed ratio.

**Operating Expense.**—The monthly operating expense of present Unit A must next be established. This expense should include repair cost, lubricating cost, transmission (belting) cost, and fuel cost.

**Economic Life and Reserves.**—In cases where the change in prime mover is not expected to bring about an increase in production, the extrapolation of the decline curve is made on the basis of the present rate of production obtained under the operation of Unit A. In this particular instance, the remaining life of the well has been estimated at 84 months, and the future production calculated by year.

**Cost Comparison.** — The exhibit shown under Table 1 includes two factors which require a rather careful treatment on the part of the investigating engineer; since, in some cases, the economic outcome of the calculation may depend largely upon the assigned values. One factor is the estimated value of the equipment after the economic limit of the well has been reached, and the other is the interest on investment charged against the proposed installation.

While the cost comparison shown in Table 1 indicates a saving of $2,716.29, the complete economic picture cannot be obtained until a comparison is made between the estimated future profit based on the operation of the present unit, and the estimated future profit to be expected if the proposed Unit B is installed. The exhibit shown under Table 2 is a calculation of the future profit using the present Type A prime mover and the figures under Table 3 show the profit which should be derived if the Type B unit is installed. Operating expense includes not only the prime mover operating cost, but all other costs involved in the operation of the well itself.

**TABLE 1—Operating Cost—Present Unit A**
(Over remaining life of well—84 months)

| | | |
|---|---|---|
| 1. Repairs to unit A (labor and material) | | $5,901.00 |
| 2. Belting | | 207.14 |
| 3. Lubricating oil | | 689.64 |
| 4. Fuel (gas available at low cost) | | 1,543.70 |
| TOTAL FUTURE OPERATING COST OF A | | $8,341.48 |
| **Installation Cost of Unit B** | | |
| 1. Estimated cost B installation | $1,972.75 | |
| Unrecoverable material | 702.00 | $702.00 |
| Interest on investment (6 per cent simple interest) | | 828.55 |
| Depreciable equipment | $1,270.75 | |
| Value at end of 8 years—20 per cent | 254.15 | |
| | | 1,016.60 |
| Investment loss | | 2,547.15 |
| **Operating Cost of Unit B** (Over 84 months) | | |
| 2. Estimated repairs to Unit B | | $804.56 |
| 3. Belting | | 207.14 |
| 4. Lubricating oil | | 270.14 |
| 5. Fuel (gas available at low cost) | | 1,796.20 |
| Future operating cost B | | $3,078.04 |
| TOTAL COST OF UNIT B | | $5,625.19 |
| SAVING IN FAVOR OF TYPE B | | $2,716.29 |

**TABLE 2—Future Profit—Present Installation A**

| Year— | ⅞ working interest of estimated future gross production | Value at $1.25 per bbl. | Well operating expense per year | Estimated future profit at $1.25/bbl. |
|---|---|---|---|---|
| 1943 | 6,414 | $8,017.50 | $1,619 | $6,398.50 |
| 1944 | 5,114 | 6,392.50 | 1,619 | 4,773.50 |
| 1945 | 4,147 | 5,183.75 | 1,619 | 3,564.75 |
| 1946 | 3,504 | 4,380.00 | 1,619 | 2,761.00 |
| 1947 | 2,844 | 3,555.00 | 1,619 | 1,936.00 |
| 1948 | 2,227 | 2,783.75 | 1,619 | 1,164.75 |
| 1949 | 1,916 | 2,395.00 | 1,619 | 776.00 |
| 1950 | 1,566 | 1,957.50 | 1,619 | 338.50 |
| 1951 | 1,291 | 1,613.75 | 1,619 | ..... |
| Estimated total future profit | | | | $21,713.00 |

**TABLE 3—Future Profit—Proposed Type B Installation**

| | | | | |
|---|---|---|---|---|
| 1943 | 6,414 | $8,017.50 | $967 | $7,050.50 |
| 1944 | 5,114 | 6,392.50 | 967 | 5,425.50 |
| 1945 | 4,147 | 5,183.75 | 967 | 4,216.75 |
| 1946 | 3,504 | 4,380.00 | 967 | 3,413.00 |
| 1947 | 2,844 | 3,555.00 | 967 | 2,588.00 |
| 1948 | 2,227 | 2,783.75 | 967 | 1,816.75 |
| 1949 | 1,916 | 2,395.00 | 967 | 1,428.00 |
| 1950 | 1,566 | 1,957.50 | 967 | 990.50 |
| 1951 | 1,291 | 1,613.75 | 967 | 646.75 |
| 1952 | 1,015 | 1,268.75 | 967 | 301.75 |
| 1953 | 858 | 1,072.50 | 967 | 105.50 |
| 1954 | 626 | 782.50 | 967 | ..... |
| Estimated total future profit | | | | $27,983.00 |
| Gross saving favoring Type B | | | | $6,270.00 |
| Less investment loss | | | | 2,547.15 |
| Net saving favoring Type B | | | | $3,722.85 |

# *What! Paper oil cans?*

## ...another job for HYCAR SYNTHETIC RUBBER

**Keep an eye out for this one** . . . you may be getting your motor oil in paper containers before long. Yes, just ordinary, inexpensive paper, but fortified and made resistant to oil and moisture, heat and cold, wear and tear by impregnating with Hycar synthetic rubber.

So effective is Hycar that only a very small amount is needed to transform paper into a tough, durable material impervious to oil, grease and dirt, and resistant to heat and abrasion. This same principle can be applied to similar products: cartons, boxes, protective wrapping for machine parts—and, after victory—bookbinding, luggage, wallpaper and numerous others.

The qualities of Hycar that make possible the transformation of ordinary paper into "oil cans"—or into tough, oil-resistant paper gaskets—are the same qualities required in many other petroleum industry applications.

Ability to withstand heat and abrasion in the presence of oil; resistance to cold-flow and compression-set . . . these are prime requirements for oil hose, packers, gaskets and seals. Tailor-made for the job, Hycar for oil industry use has these qualities in full measure.

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*Engineering Fundamentals* No. 88

A WEEKLY FEATURE OF THE OIL AND GAS JOURNAL

# USE OF A SUBSURFACE PRESSURE GAGE ON FORMATION TESTS

A FORMATION tester is a device used to test the productivity of a formation without running casing or removing the drilling mud from the well. The tool is run on the bottom of a string of rotary drill pipe; and is provided with a valve that can be kept closed while running into the well, so that no well fluid is admitted to the inside of the drill pipe while running it into the hole. A packer is provided on the tool so that when the desired testing point is reached the pressure of the mud column in the well can be excluded from the face of the possible producing formation by setting the packer at, or slightly above, the top of such formation. After the packer is set, the valve of the tester is then opened by rotation or slight vertical movement of the drill pipe at the surface. This allows any fluid in the formation below the testing point to enter the drill pipe through the open valve. If sufficient gas and oil are present, the well may flow through the drill stem to the surface. At least, if the tester is allowed to remain open for a certain period of time a measure of the productivity of the well can be obtained by the amount of water and/or oil that enters the drill pipe. The valve is next closed by manipulation of the drill pipe string at the surface. The tester can then be raised from its seat, the pipe removed from the well, and the volume of the entrapped sample measured. In the case of a non-productive formation, of course, the drill pipe would contain no oil when withdrawn.

When the formation tester was first used quite a lot of difficulty was experienced because in many cases it was next to impossible to determine if lack of positive indications of oil and gas on a test was due to their absence in the formation or due to ineffective operation of the packer or valve mechanism of the tester. Such difficulties led to the use of a subsurface pressure gage in connection with the tests in order to have a basis for deciding if an effective test is actually obtained in each particular case.

The use of subsurface pressure gages on formation tests was first reported by Christie* in 1936, and has since become general practice. A leading manufacturer of formation testers has developed a pressure recording device especially for use on formation tests. However, any recording pressure gage suitable for taking other depth pressures in wells can be used on such a test by placing the gage rigidly in a perforated pipe attached below the tester so that a record is obtained of the pressure changes in the space below the packer of the tester.

### Pressure-Gage Record

The record from the pressure gage shows all pressure changes that occur at the gage level from the time it enters the hole until it is removed. Information that can be obtained from such a record includes the following items:

1. The pressure gradient of the mud column as indicated by the increase in pressure while the tester is being run into the well and by the decrease in pressure as the tester is being pulled out of the well. This may be of value as an indication of the degree of differential settling of the mud in the well and also as an indication of the presence of gas in the mud column.

2. The amount that the mud-column pressure exceeds the formation pressure may be obtained. This is an important item of information since one can decide if a sufficient margin of safety is maintained in favor of the mud column in order to eliminate the possibility of a blowout. In some cases it may be found that the mud column is too heavy, thus causing undue loss of mud, or water from the mud, to a zone with productive possibilities.

3. An indication of the seating of the packer is obtained.

4. The pressure record will indicate whether or not the tester valve was opened during the test.

5. The flowing pressure of the well is obtained while the tester valve is open.

6. The rate of pressure buildup following production may be obtained by leaving the packer set for a sufficient period of time following the closing of the tester valve.

A typical pressure record that may be obtained from a production stratum is illustrated in Fig. 1. At

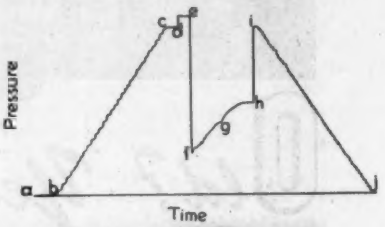


*Fig. 1*

point **a** the clock of the gage is started before the tester is started in the well. Point **b** represents the time at which the tester was started into the well. Point **c** represents the time and pressure when the gage reaches the testing point. Thus the horizontal distance between points **b** and **c** represents the time required for running the tester into the well, while the vertical distance between the two points represents the pressure exerted by the mud column. The sudden increase in pressure at point **d** is caused by fluid compression accompanying the seating of the packer. At point **e** the valve of the tester is opened as evidenced by the sudden drop in pressure to that of point **f**. The tester is left open for a period of time represented by the horizontal distance between points **f** and **g**, and the flowing pressure at any time during this period can be observed by measuring the vertical height of any point above the base line, **aj**. At point **g** the valve is closed and the pressure buildup is indicated by the line **gh**. The level portion of this line, just to the left of point **h**, represents the static formation pressure.* The line **hi** represents the increase in pressure back to that exerted by the mud column, due to unseating the packer. The decrease in pressure as the tester is withdrawn from the well is indicated by the line **ij**.

*Christie, R. S., "Use of Recording Pressure Gages in Drill-Stem Tests," Drilling and Production Practice, A.P.I., 1936, pp. 8-12.

*Usually, time will not permit leaving the tester in the well a sufficient length of time to obtain this value.

# Old? Yes... and Work-Wise!

Elderly Ludlow Valves—like a work-wise veteran who has long followed his trade—are proving their worth in these days of equipment shortages. Oil men find that even grandfather-aged Ludlows have a surprising amount of active service left in their still sturdy bodies. Checked-up at the repair clinic and reoutfitted, they're going back on the job—for duration!

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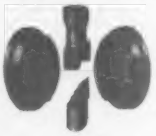
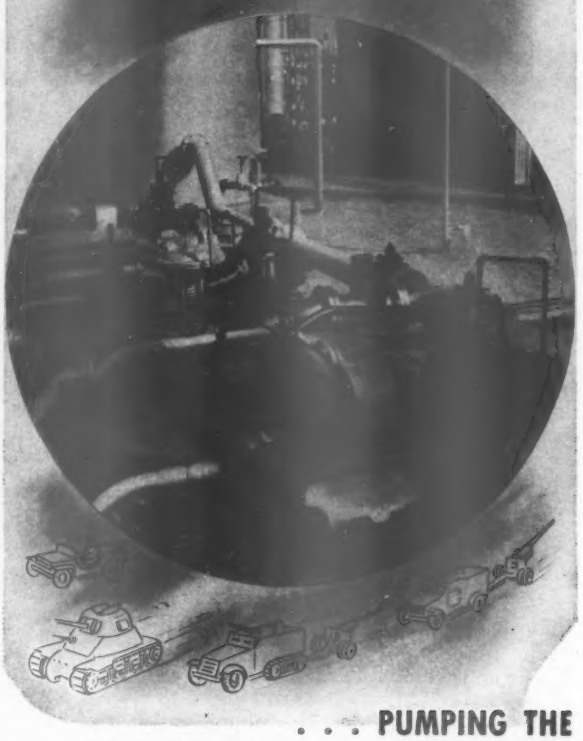


LUDLOW VALVES SINCE 1866

# GOULDS PUMPS



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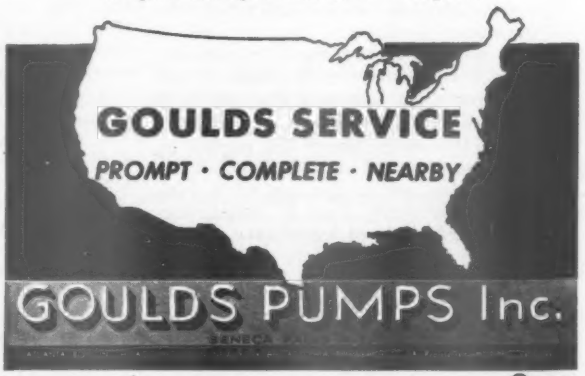


3930

# Natural Gas

## Furnace Blacks Compose 24 Per Cent of Total Yield

WASHINGTON, D. C.—An increase of 7 per cent in the relative position of furnace blacks in the carbon-black industry last year was reported this week by the Bureau of Mines, Petroleum Economics Division.

Furnace blacks constituted 24 per cent of the total production last year, 17 per cent in 1941 and 13 per cent in 1940. Production of all types of carbon black declined 3 per cent while sales were off 30 per cent last year.

Natural gas burned in the manufacture of the 574,006,000 lb. of carbon black produced in 1942 amounted to 335,533,000 cu. ft., 8 per cent less than was used in 1941. The higher percentage of furnace blacks manufactured last year, a process in which yields are greater, accounted for the discrepancy in declines between gas burned and the production.

The average value of carbon black at plants last year was 3.41 cents per pound compared with 3.26 in 1941. Manufacturers paid an average of 1.29 cents per 1,000 cu. ft. for gas burned compared with 1.13 cents in 1941.

## Industrial Consumption Continues Increase

NEW YORK. — An increase of 8.3 per cent in sales of natural gas by utility companies reporting to the American Gas Association prevailed in January, according to statistical data released here last week.

The most substantial increase was accounted for in the service of industrial consumers and for electric generation, two classes which increased their combined requirements by 13.4 per cent compared to the same month a year ago.

Total consumption during the month was 193,526,300,000 cu. ft. Industrial consumption accounted for 79,482,-100,000 cu. ft., while domestic requirements were 69,576,700,000 cu. ft.

## Hearing on Ohio Fuel Deliveries Reset for June 15

COLUMBUS, Ohio. — The state Public Utilities Commission has postponed from May 25 to June 15 a hearing on the citation of Ohio Fuel Gas Co. to cease furnishing stabilized gas instead of natural gas to Columbus consumers. The postponement was made at the request of the company.

## Gas Limited in Cayuga And Long Lake Fields

AUSTIN, Tex.—Threatened suspension of production from the Long Lake and Cayuga fields in East Texas was averted last week by issuance of a gas-conservation order specifically limiting withdrawals from the reservoir to 5,000 cu. ft. of gas per barrel of oil. Operators must arrange for diverting at least 3,000 cu. ft. of the permitted gas production per barrel of oil to legal uses, leaving a margin of 2,000 cu. ft. for other disposition.

Gas reinjected into the formation from which it is produced is considered to have been not withdrawn and, therefore, is not calculated in determining compliance with the order.

In arriving at the gas limit for any well in the two fields, the daily current oil allowable provided for such well shall be multiplied by the gas-oil ratio applicable under provisions of the order, and no such well shall be permitted to produce an amount of oil per day which will cause the gas production to be above the gas limit fixed by the Railroad Commission. Operators may divide any lease in the two fields into production units of contiguous acreage of not more than 320 acres that contain not more than 16 wells each and produce and operate the wells as follows:

1. Not to exceed half of all wells on any production unit may, at the election of the operator, be closed in and the allowable transferred to any other wells. No well may be assigned a greater amount of shut-in allowable than the equivalent of the allowable for said well and before the transfer of any part of said shut-in allowable to it.

2. Before the allowable of any closed-in well or wells may be produced from any other well or wells the operator must file a plat with the Railroad Commission showing the location of all wells on the affected production unit, the proposed closed-in wells and the wells on which the allowables are to be produced.

More rigid conservation of gas was insisted upon in the two fields by the Petroleum Administration for War and it was assumed that the new order had approval of that agency.

## Cabot Renews Effort to Halt New York Service

WASHINGTON, D. C.—Cabot Gas Corp. has filed petition with the Federal Power Commission for permission to abandon the service of natural gas from its 14-in. line to its customers in New York and to abandon transportation of gas for ultimate redelivery to Godfrey L. Cabot, Inc., parent concern.

The application states that the Cabot Gas Corp.'s present customers are the Pavilion Natural Gas Co. and domestic and commercial consumers in the villages of Rossburg, Fillmore and Hume, Allegany County, and isolated domestic and commercial consumers along the 14-in. line in New York. Applicant declares that "it is well known that the 74.75 miles of 14-in. steel pipe line would be more useful in serving the war effort if removed from its present location and transferred to some other part of the country."

Earlier this year, the FPC rejected petition of Cabot Gas Co. and Godfrey L. Cabot, Inc., to abandon the Allegany County line and services. The new petition is a renewal of the previously rejected application.

# Natural Gasoline

## Production Shows Slight Increase During March

WASHINGTON, D. C.—Production of natural gasoline and allied products increased slightly in March to a daily average of 9,968,000 gal., up 8,000 gal. from the February average. Production was relatively unchanged in the various districts.

The Bureau of Mines introduced several changes in the March summary of production of allied products. The increasing use of benzene at refineries is recognized and the estimated production of 8,400,000 gal. per month is introduced in supply data to offset a somewhat smaller figure included in liquefied petroleum gas used at refineries.

## Western States Transfers All Texas Properties

LOS ANGELES, Calif.—Western States Gasoline Corp., operator of two natural-gasoline plants in California, has transferred all Texas properties to the Permian Oil Corp., Lubbock, Tex. The transfer was effective May 1.

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EDITOR AND MARKET ANALYST

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FIRST ISSUE WILL BE FOR MONTHS
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*Forms Close August 1st*

# PETROLEO INTERAMERICANO
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FOR five consecutive years, the petroleum industry of the United States has drawn larger quantities of petroleum from known reserves than have been replaced by new discoveries.

Simultaneously, the greatest geophysical exploration campaign in all history has been going on without materially adding to known reserves. Unless this trend changes, the United States will turn from an exporter of petroleum to an importer within the next several years.

Thus, it is important to look with keener interest to Latin America, now considered the world's greatest frontier for discovery of new petroleum reserves, for expansion of pipe line and refining capacity; and for consumption of petroleum products.

Possibilities are tremendous, and they will be developed as one of the principal postwar activities of the petroleum industry.

Having studied this problem for several years, the editors and management of The Oil and Gas Journal have concluded that the only way to completely and properly cover this market is through a Spanish and English publication, issued every other month, with attention focused on newest operating methods, new applications and uses of equipment, important engineering advancements—and dissemination of information which will work toward a closer understanding and application of problems among the oil producing countries of the Western Hemisphere.

Accordingly, PETROLEO INTERAMERICANO was conceived and developed with a feeling of good-neighborliness, and with a farsighted view to markets for petroleum equipment and services in the future.

### *Selling Latin America Is Bilingual Job*

One of the big weaknesses of the American approach to Latin American markets in the past has been our reluctance to recognize importance of Latin nationals in the buying picture. We have forced them to learn English in order to do business with us rather than take the trouble of addressing them in their own language.

Today, most of the field operating supervisors and engineers are English speaking and American trained, yet an important number of Latin nationals are being placed in responsible supervisory posts, and their number is growing rapidly.

The potentialities of the Latin American market certainly warrant special cultivation of these peoples by speaking to them in their language. PETROLEO INTERAMERICANO will transmit your message in both Spanish and English . . . to the right people . . . and in the most effective manner.

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PETROLEO INTERAMERICANO will have a guaranteed distribution of 3,000 or more copies, every other month, to thoroughly cover Latin American countries in which oil is produced, refined, transported, or marketed, and their headquarters offices, wherever they may be. Distribution will include government agencies dealing with petroleum in the various countries. Technical schools and libraries will also be supplied.

Editorially, pictorially and in make-up PETROLEO INTERAMERICANO will be outstanding from every standpoint, affording a powerful advertising medium for manufacturers and service organizations who wish to effectively cultivate this market. The first issue will naturally create intense interest which will increase even as time goes on. If you are interested in the Latin American petroleum market plan to be represented in PETROLEO INTERAMERICANO—the publication which assuredly will be the leader in its field!

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# REFINING

## Furnace-Type Carbon Black Allocated Only for Rubber

Carbon black—furnace type—is allocated during May only for rubber compounding, no other requests for allocation being granted, so states a report by the Chemicals Division of the War Production Board.

Petroleum xylol is being substituted for coal tar xylol in all cases where the former can be used; 19 per cent of the civilian requests for May are denied.

Solvents of toluene range are sharply restricted, and indications are that they will be further restricted in the immediate future.

Furfural use in "miscellaneous chemical manufacturing" has been reduced 50 per cent. Synthetic methanol (wood alcohol) is denied entirely for radiator antifreeze, granted in full for all other purposes.

Methyl ethyl ketone (MEK dewaxing solvent for lubricants), is granted to the extent of 50 per cent of requests for dewaxing purposes.

## Continental May Rebuild Montana Plant at Billings

DENVER, Colo.—Montana reports are that the Continental Oil Co. will move its refinery at Lewistown, Mont., which recently was shut down, to Billings and rebuild it to operate on crude from the Frannie field where the company has its own production.

The plant formerly operated on Cat Creek crude, but recently this production was sold to a Canadian buyer. A refinery site at Billings was acquired several years ago.

## Refiners Urged to Speed One Report, Ignore Another

WASHINGTON, D. C. — Refiners this week were urged to complete one new questionnaire from the War Production Board as promptly as possible and, at the same time, were advised that another report (WPB 732) should be returned to the sender unanswered.

F. A. Watts, director of materials for PAW, said that the Redistribution Division of the War Production Board, the Copper Recovery Corp. and the Steel Recovery Corp., mailed out questionnaires to determine whether or not any industry owns or controls an excess stock of controlled materials. The questionnaire dealing with this subject, Mr. Watts said, should be filled out and returned as soon as possible. It is designed to redistribute any existing excess stocks with the petroleum industry to have first call on the materials.

WPB 732, a report on operations, Mr. Watts advised, should be returned to the sender with the information that it is understood that petroleum industry operators are not required to compile and submit the data.

## Iowa Raises Tolerance On Sulfur in Gasoline

Sulfur tolerance for gasoline qualifying under Iowa law has been increased to 0.25 per cent for duration of the war, according to advice received by the Western Petroleum Refiners Association from E. L. Redfern, chief chemist, state Department of Agriculture.

After the emergency has passed, Mr. Redfern said, the maximum limit of sulfur will automatically revert to 0.10 per cent which prevailed before the war.

## Continental Shuts Down Lewistown, Mont., Plant

DENVER, Colo.—Continental Oil Co. has discontinued operation of its skimming plant at Lewistown, Mont., probably for an indefinite period. The plant had been operating on crude from the Cat Creek (Montana) field which has been diverted to British-American Oil Producing Co., for shipment to Canada. Cat Creek production currently amounts to about 360 bbl. daily. Employes of the Continental plant at Lewistown will be absorbed in other company operations.

## Flowmeter Production Adequate for Demand

WASHINGTON, D. C.—At present there is no need for the War Production Board to screen purchase orders for differential type flowmeters, used largely in the manufacture of petroleum products, according to producers.

Differential flowmeters are listed as a critical common component in Order M-293, but are not classified with Y items which would call for WPB review of new purchase orders.

Manufacturers stated that the industry is not meeting with difficulty in making deliveries. Current orders by all of the claimant agencies call for delivery dates so far in advance that they can be fitted easily into delivery schedules.

## Rubber Dilemma Solved From Technical Standpoint

AKRON, Ohio.—Technologically and from the sole standpoint of military needs, this country is practically "over the hump" of its rubber dilemma, according to one of the nation's most recently honored synthetic-rubber experts.

Dr. L. B. Sebrell, head of the Goodyear Tire & Rubber Co.'s research department, who received one of the American Chemical Society's highest awards at its spring meeting in Detroit, Mich., expressed an opinion last week that the United States will soon be militarily independent of rubber from outside sources.

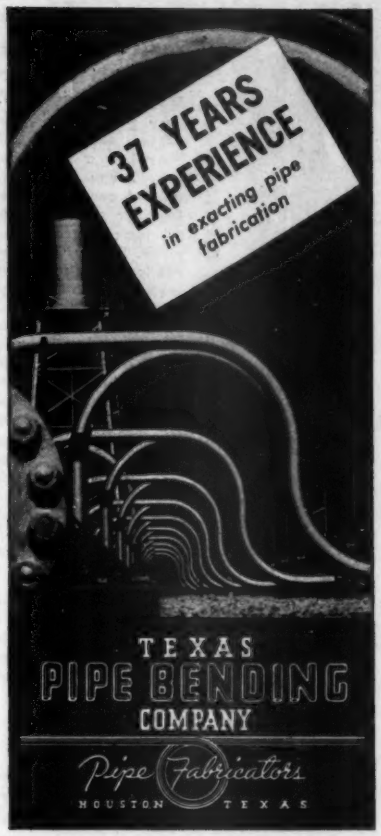
Research on synthetic rubber has progressed to the point, he said, that it can be converted into almost any needed war product if no more natural rubber was available.

Dr. Sebrell emphasized that his optimism regarding the technology of synthetic rubber is restricted entirely to war products now being made from synthetic rubber or which might some day have to utilize synthetic rubber.

## Pacific Coast Butadiene Plant Nearly Complete

SAN FRANCISCO, Calif.—Standard Oil Co. of California expects to have a large butadiene plant completed and in operation early in September, it was disclosed last week by H. D. Coolier, president, at the company's annual stockholders' meeting here.

The new plant, first of its kind on the Pacific Coast, will produce the principal ingredient used in the manufacture of synthetic rubber.




# Sketches of Plant Operators

A NATIVE of the environs surrounding the battle field of Gettysburg is helping produce oil ammunition for this war as a new assistant general superintendent of the Whiting, Ind., refinery of Standard Oil Co. of Indiana.

He is Dr. A. S. Musselman who was born at Gettysburg, Pa., and after attending the local high school was graduated from Gettysburg College in 1912 with the degree of bachelor of science. He continued at Johns Hopkins University, majoring in chemistry, and received his doctor of philosophy degree in 1915.

After serving 2 years with other companies Dr. Musselman joined Standard of Indiana as a research chemist at Whiting in 1917. He assumed charge of the analytical department in 1922 and a year later was transferred to the paraffin department in charge of treating operations, becoming assistant superintendent of the paraffin department in 1927 and superintendent in 1929. When the heavy-oils division was formed in 1931, Dr. Musselman was appointed superintendent in charge of the paraffin, filtering oils, wax, grease, barrel, candle and can departments, which position he held until February 1, 1943, when he was promoted to his present position as an assistant general superintendent of the Whiting refinery.

Active in civic affairs, Dr. Musselman is a director of both the Whiting-Robertsdale Chamber of Commerce and the Whiting-Robertsdale Fund Raising Committee, a trustee of the Whiting Memorial Community House, an executive committee member of the Whiting Relief and Aid Society, and a member of the East Chicago Chamber of Commerce.

His long association with the Whiting Boy Scouts stands him in good stead to help rear Phillip Kent Musselman, who is 10 months old. Dr. Musselman met his wife in Baltimore, Md., while at Johns Hopkins.

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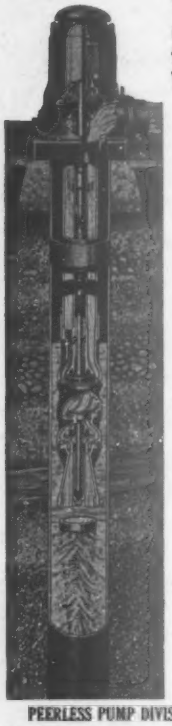

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# PIPE LINES

## WEP Shipments Again Cut By Tank-Car Shortage

At the beginning of the week there were no empty tank cars at the Norris City, Ill., terminal of the War Emergency Pipelines, Inc., 24-in. crude-oil line from Longview, Tex. Withdrawal of tank cars for other service is responsible for shipments being less than would be expected. Last week, an average of approximately 182,000 bbl. were loaded in about 854 tank cars daily at Norris City. For 3 days over the week end, deliveries to Ohio Pipe Line Co. at Enfield, Ill., averaged nearly 55,000 bbl. All empty cars coming to Norris City are loaded shortly after arrival.

At the Longview terminal 186,000 bbl. of West Texas crude had arrived the first of this week. When 400,000 bbl. of West Texas crude have accumulated in storage there, by the end of this week, it is expected that a batch of 300,000 bbl. will be put through the line to Norris City.

Laying of pipe for WEP was held back last week by rains which bogged down the work all along the line. On Sunday, May 16, only 1.46 miles of 24-in. and 1.37 miles of 20-in. pipe for the eastern crude-line extension, and 2.24 miles of pipe for the 20-in. products line were laid.

At Norris City, eight 80,000-bbl. tanks have been completed. All of the 16 tanks at Longview have been finished. Construction of pump stations for the eastward extension is being pushed, particularly at the "odd numbered" station sites.

## Workers Return to WEP Illmo Section

Employes of the Bolz Dredging Co. carried out instructions from their A.F.L. union leaders last week and returned to work on a Mississippi River crossing for the new Texas-to-New Jersey pipe line.

The union officials gave the War Labor Board assurances in Washington the workers would go back to their jobs so the WLB could begin an investigation of employment practices on the WEP project.

Employes of the Bolz company walked out April 28 in support of an effort to force employment of Missouri union members by two other companies holding pipe-line contracts. These firms, the Dunn Construction Co. and the Oil States Construction Co. have been working under protection of a detachment of the Missouri State Guard, called out by Gov. Forrest C. Donnell to preserve order after two outbreaks of violence had forced suspension of operations.

## WPB Studies Sinclair Plan For Chicago-Toledo Line

The proposal of Sinclair Refining Co. to build a refined products line from Chicago, Ill., to Toledo, Ohio, has been approved by WPB, according to reports. However, the engineering subcommittee concerned with the matter has recommended further investigation in regard to certain points which are specified in a section of one of its reports as follows:

"This line would move refined products from the refining centers near Chicago to the points of consumption which would relieve lake tankers that normally handle this movement during the summer. This would decrease the amount of storage necessary and make for more even refining runs during the year. The group decided, however, it was not in position to recommend this particular line unless assured that the tankers freed could be removed from the lakes and used to advantage elsewhere. Further, that there was no reason to build a pipe line from Chicago to Toledo until existing lines were used to the fullest capacities. This had to do with the Stanolind, Shell and Sohio systems which can still handle a few thousand barrels more per day and, in fact, might be enlarged by the addition of intermediate stations to move more products from Chicago via pipe line to Toledo without building new lines."

The Sinclair organization has been studying arrangements to be made at Maumee, Ohio, for the storage of pipe to be brought to that area as the result of digging up lines in the Mid-Continent.

Elsewhere in this issue an article describes a proposal being considered by PAW for the laying of a heating-oil line from Albany, N. Y., to an Everett terminal in the Boston, Mass., metropolitan district via Pittsfield, Northampton and West Boylston, Mass.

## Plantation Is Completing Extension Pump Facilities

When the last pump station on the Greenville, N. C.-Richmond, Va., extension of the Plantation Pipe Line Co. system is completed it will be possible to deliver 30,000 bbl. of refined products daily at the northern end. Recently the Plantation extension has been shipping at the rate of 22,000 bbl. daily. Extensive use of barges is made for deliveries.

## Contractors Prepare to Lay Panhandle Eastern Loops

The laying of 328 miles of 24-in. and 26-in. loops along the Panhandle Eastern Pipe Line Co. system will start within a month according to reports. It is expected that contracts for the project will be awarded as follows: Bechtel-Dempsey-Price, 241 miles of 24-in. and 26-in. pipe in six loops between compressor stations at Sneed, Tex., and Louisburg, Kans. It is rumored that Midwestern Engineering & Construction Co. will contract the laying of 87 miles of 24-in. in Indiana and Ohio, in the vicinity of the Zionsville, Ind., compressor station and east of Edgerton, Ind., mostly in Ohio.

## Features of Stanolind West Texas Line Discussed

Since several major companies are reported to have indicated an interest in participating in ownership of the line which Stanolind Pipe Line Co. proposes to build from West Texas to the Drumright-Cushing, Okla., district, there has been some discussion of the problems presented by such a project.

If the line were built as a 20-in. instead of a 16-in. line, as originally proposed, marked increases in capacity could be effected. Estimates of capacity with various pump station spacings have been made. Because of the terrain there would be a static pressure of 1,000 lb. With one station raising pressure an additional 700 lb., such a 20-in. line would have a capacity of 99,000 bbl.; with two stations, 121,000 bbl.; with three stations, 139,000 bbl.; with four stations, 156,000 bbl.; with six stations, 187,000 bbl.; with eight stations 214,000 bbl. It has been pointed out that a line built on a level would have an increase in capacity of 50 per cent by the addition of a station of the type considered. But owing to the sloping terrain of this line an increase in capacity of 22 per cent may be expected by addition of such a station.

Entering into consideration of joint ownership of such a line, there came a number of problems, of a legal as well as economic nature. Careful study must be given to methods for complying with Texas laws restricting participation by a major oil company in the ownership of other pipe lines.

There is also the matter of taxes on intercompany dividends. At present there are numerous instances, where companies shipping through a line, do so on different tariffs for the same distances. The question has been raised as to whether the ICC would permit more than one tariff for the line. In some cases where lines have been jointly owned, problems have arisen in connection with the allotment of capacity. There have been instances where the company originally undertaking the building of a line found itself as a result of joint arrangements, unable to transport sufficient oil for its own needs through the line.

## Armed Forces Demand More Eastward Shipments

Standard Oil Co. (New Jersey) said last week that while an increased volume of oil was moving to the eastern seaboard area, United States armed forces abroad will "need every extra gallon that can be laid down on the American East Coast."

After pointing out how tank-car, barge and pipe-line movement of oil products eastward had been stepped up, the company commented in its magazine, the Lamp:

"But the plain fact is that no substantial letup in rationing restrictions can be anticipated for some time to come."

Standard said rail deliveries to the East—including drums of oil shipped in box cars—were running at a rate between 900,000 and 1,000,000 bbl. a day.

"The tide of oil moving overland and by inland waterways from southwestern fields and refineries to the Atlantic seaboard is expected to reach 1,600,000 bbl. a day by next winter, supplemented by another 75,000 bbl. a day of eastern production," Standard said. "This total of 1,675,000 bbl. daily is higher than the winter peak of 1943 and much higher than the domestic demand in this area under government rationing.

"Allowing for distillate and heavy fuel consumption during the 1943-44 heating season of 75 per cent of normal peacetime requirements and gasoline rationing in the East figured on a basic "A" ration of 3 gal. a week, estimated deliveries here should still provide substantial surplus for shipment overseas.

"Beyond this point it is impossible for anyone within the petroleum industry itself to prognosticate. The industry does not know what military demands will be over the balance of the year. It does not know when it may be called upon to load an entire convoy with gasoline, fuel oil or other products, nor from what point along the coast."

## ODT Launches New Barge Building Program

A fleet of 168 all-steel petroleum tank barges, with a total carrying capacity of 1,600,000 bbl., will be constructed immediately for operation on the Mississippi and Ohio rivers, for transporting crude oil and petroleum products to the East Coast, the Office of Defense Transportation announced last week.

The all-steel welded barges have replaced 195 wooden ones on the program authorized last December. It is expected that many of the steel boats will be ready for service by late October, when the 21 river towboats which will haul them are scheduled for delivery.

ODT said work is progressing well on the waterway equipment intended to increase the transportation of oil to the eastern seaboard. Actual construction is under the direction of the U. S. Army Engineers and the Inland Waterway Corp.

Other changes in the program include abandonment of plans for a water-rail transshipment terminal at Olmstead, near Cairo, Ill., and reduction of the number of steel dry-cargo barges to be converted to petroleum carriers.

The decision to build 168 barges, instead of 195 of the 500 wooden units called for in the original program, was affected by several factors, the ODT said.

A shift in emphasis to light oils—the so-called "clean products"—as barge cargo made completion of the entire 500 wooden barges impractical, since only heavy residual fuel oil can be moved safely in the wooden boats. The all-purpose steel barges, however, will be able to move whatever petroleum products are offered, navigate the upper Ohio River and operate much more efficiently than their wooden counterparts.

## Toronto Pipe Line Program Provides Wyoming Outlets

Toronto Pipe Line Co. has just completed 13,000 ft. of 4-in. line in the Steamboat Butte area of Wyoming. This line will start operation this week in connection with delivering 19-gravity crude to tank trucks for forwarding to the Chicago Northwestern Railroad at Riverton, Wyo.

An application has been made to federal authorities for permission to build a 30-mile 6-in. line from the Steamboat and Pilot Butte fields, Fremont County, Wyoming, to the Burlington railroad.

## Advance Recording of an Axis Temblor!

**Throughout the oil provinces of the nation an army of seismologists is busy mapping tomorrow's oil fields from which will flow the wherewithal to attain victory. The bombs that blast the axis from Berlin to Bangkok to Tokio may come from the Miocene in South Louisiana or the Glen Rose in East Texas. The *coup de grace* might well be labeled with the compliments of American seismologists for it is they, working in close harmony with American oil producers, who not only have been instrumental in establishing the petroleum reserve that has carried us thus far along the road to victory, but whose ingenuity and aggressiveness assures a steady flow of fuel to our fighters.**

General
GEOPHYSICAL COMPANY GGC HOUSTON

# Exploration and Drilling

## Week's Highlights

DURING recent weeks the geological societies of the oil country have listened with great interest to a discussion of a new method of classifying sedimentary rocks. It is possibly significant that the objections to the method at one meeting centered around the use of the word "greywacke" which is a foreign word. So also are "dolomite" and "anticline."

The thesis advanced by the speaker is that there are three principal classes of sedimentary rocks, the normal, or quartzose, sediments, and the greywacke and arkose groups of which the coarser varieties of the former contain shale and other rock fragments and those of the latter include grains of feldspar. These types, according to Professor Krynine are derived from different rock masses, the admixture of rock fragments to the sand being due to a greater amount of uplift of the land masses and the feldspar grains to a much greater uplift and deeper erosion. As examples of the three classes, the Wilcox sand of Oklahoma, the Bradford sands of Pennsylvania and the sands of the San Joaquin Valley may be cited.

At first glance, this might appear to be an academic matter but separating the greywacke class of sediments from the others presents interesting possibilities for additional research on secondary recovery. The distinction between a pure sandstone and a greywacke is not the difference between a pure and an impure sandstone. The normal suite of sediments can contain impure sands but the impurities tend to be clay minerals which are colloidal and lead to impermeability of the rock. In the greywacke suite, the sand grains are not as well rounded as in the normal suite and the contaminating matter consists of mineral and rock fragments. The porosity of these sediments may be greater or less than that of equivalents in the normal suite but the permeability will generally be less because of the irregular shape of the grains, thus accounting in part for unsatisfactory recoveries by primary methods and the successful operation of secondary methods.

The examination of cuttings and cores by means of the binocular microscope does not give nearly as clear an idea of the nature of the grains as examination under a polarizing petrographic microscope, which is the technique recommended by Professor Krynine. The classification of sediments may not be of great interest to the oil geologist but the fact that a tool which every graduate geologist has used in studying igneous rocks can be applied to oil reservoirs should be of much importance.

From the study of reservoir rocks it is but a step to tracing shore lines and other details of great value. Sediments of the greywacke suite lie mainly in areas where there are multiple sands, such as the Appalachian basin, eastern Oklahoma and Kansas, North Central Texas and the Gulf Coast where detailed correlations have proved difficult and where there are many possibilities for stratigraphic traps.

Whether or not Professor Krynine's theories will stand up is a far less important matter than the fact that he has reintroduced to the geological profession a tool with which it is familiar but which it rarely uses in the search for oil. Microscopes are costly and the preparation and examination of thin sections are tedious. Drilling dry holes falls into the same categories. So also do unprofitable secondary-recovery projects.

**EAST TEXAS:** Franklin County's Travis Peak discovery is also producing from the Rodessa formation (p. 108).

**WEST TEXAS:** Another Ellenburger producing area has been opened in Winkler County (p. 107).

### COMPLETIONS IN ALL FIELDS . . .

(Week Ended May 15, 1943)

| | Oil | Gas | Dry | Total | Footage | Total comp. to date 1943 | 1942 |
|---|---|---|---|---|---|---|---|
| N. Y., Pa., and W. Va. | 57 | 11 | 5 | 73 | 149,239 | 1,159 | 1,332 |
| Ohio | 3 | 9 | 5 | 17 | 44,582 | 275 | 360 |
| Indiana | 3 | 0 | 1 | 4 | 6,447 | 87 | 114 |
| Kentucky | 0 | 0 | 3 | 3 | 7,714 | 115 | 86 |
| Illinois | 20 | 0 | 13 | 33 | 87,722 | 646 | 553 |
| Michigan | 3 | 0 | 2 | 5 | 15,025 | 156 | 239 |
| Kansas | 16 | 0 | 12 | 28 | 98,092 | 529 | 533 |
| Nebraska | 0 | 0 | 1 | 1 | 2,520 | 9 | 18 |
| Missouri, Iowa | 0 | 0 | 0 | 0 | 0 | 4 | 9 |
| Oklahoma | 5 | 1 | 6 | 12 | 42,588 | 397 | 492 |
| Texas: | | | | | | | |
| North Central Texas | 14 | 0 | 21 | 35 | 89,983 | 444 | 464 |
| West Texas | 13 | 0 | 4 | 17 | 73,812 | 310 | 662 |
| Texas Panhandle | 3 | 1 | 1 | 5 | 12,518 | 64 | 172 |
| Eastern Texas | 4 | 0 | 6 | 10 | 50,578 | 92 | 161 |
| Texas Gulf Coast | 4 | 0 | 9 | 13 | 89,922 | 143 | 319 |
| Southwest Texas | 6 | 0 | 4 | 10 | 45,238 | 396 | 520 |
| Total Texas | 44 | 1 | 45 | 90 | 362,054 | 1,362 | 2,298 |
| North Louisiana | 3 | 2 | 4 | 9 | 44,281 | 110 | 191 |
| Louisiana Gulf Coast | 6 | 0 | 4 | 10 | 87,414 | 117 | 203 |
| Total Louisiana | 9 | 2 | 8 | 19 | 131,695 | 227 | 394 |
| Arkansas | 6 | 0 | 3 | 9 | 36,860 | 86 | 56 |
| Mississippi and Southeast | 0 | 0 | 1 | 1 | 10,502 | 26 | 22 |
| Montana | 2 | 0 | 1 | 3 | 6,432 | 62 | 57 |
| Wyoming | 1 | 0 | 0 | 1 | 4,051 | 42 | 36 |
| Colorado, Utah | 0 | 0 | 0 | 0 | 0 | 5 | 4 |
| New Mexico | 3 | 1 | 0 | 4 | 11,036 | 76 | 88 |
| California | 30 | 1 | 5 | 36 | 96,177 | 435 | 302 |
| Total United States | 202 | 26 | 111 | 339 | 1,112,746 | 5,695 | 6,999 |
| Total previous week | 117 | 34 | 109 | 319 | | | |
| Week ended May 16, 1943 | 173 | 32 | 84 | 289 | | | |

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March 31, 1943

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Very sincerely yours,

PRODUCTION SERVICE COMPANY

J. F. Corley
Partner

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# Third Winkler County Wildcat Finds Ellenburger Oil

MIDLAND, Tex. — Stanolind Oil & Gas Co. 1 W. D. Blue, 990 ft. from the north and west lines of Section 15, Block 46, Township 1s, T.&P. Ry. Survey, eastern Winkler County wildcat, topped Ellenburger at 10,465 ft., and showed saturation from 10,469-80 ft. to indicate opening the third Ellenburger pool in the county in the last 2 months. The test was drilled by Shell Oil Co., Inc., to 9,437 ft., and was taken over by Stanolind only a few weeks ago on a partnership deal. Elevation is 3,098 ft., Simpson was topped at 9,510 ft. The well is 15 miles east, 3 miles south of Amon G. Carter C-2 Walton, first Ellenburger strike in the county, and 17 miles north, 4 miles east of Shell Oil Co., Inc., 1 Sealy-Smith, Ellenburger discovery in Ward County. The Carter well is still waiting on cement. Magnolia Petroleum Co. 20 State-Walton flowed 440 bbl. of oil in 16 hours on ¼-in. choke, last reported gage.

**Howard County.** — W. S. Guthrie 1 Pauline Allen, SE SE Section 57, Block 20, Lavaca Navigation Co. Survey, new pool opener in northeastern part of the county, pumped 7 bbl. the first hour of the test, 27-gravity, from corrected total depth of 4,096 ft. Geologists are not agreed as to source of the oil, some calling it the Tubb pay of the Clear Fork, and others calling it Wichita, lying directly below the Clear Fork. Before rigging up pump the hole had been deepened from 4,071 ft.

**Andrews County.**—A ½-mile-south extension for the Fullerton pool was assured when Fullerton Oil 1-A University, NE NE Section 6, Block 13, University Survey, flowed 43 bbl. the first hour of the test, 22 bbl. the second hour, after 2,000-gal. acid treatment at a total depth of 6,990 ft. Skelly Oil Co. 1-K University, Section 28, Block 9, University, was drilling below 6,600 ft. after passing up favorable indications for production in the Holt horizon.

**Crane County.**—Magnolia Petroleum Co. 21 P. J. Lea, Sand Hills pool Ordovician test, was drilling below 5,310 ft. Gulf Oil 1 W. A. Estes, Section 2, Block B-28, Public School Land, plugged back to 3,883 ft. from a total depth of 7,777 ft., swabbed 12 bbl. in 16 hours after shooting with 250 qt. from 3,825-80 ft. in the Holt horizon of the lower Permian, indicating a small well.

**Pecos County.**—Magnolia Petroleum Co. and Anderson-Prichard 1 State-Powell, Section 96, Block 10, H.&G.N. Survey, northeast of the Apco-Warner pool, total depth 3,557 ft., made 110 bbl. oil plus 42 bbl. of water in 2½ hours through 1-in. choke, and then made 449 bbl. of oil and 44 bbl. of water in 11½ hours. The crude tests 19.7 gravity at 60°. No gas comes with the oil, and it is flowing from hydrostatic pressure.

**Upton County:** Texas Pacific Coal & Oil Co. announced plans to deepen its 52-A Lane, SW NW SE Section 5, G.C.& S.F. Ry. Survey, McCamey pool, to Ordovician or 7,000 ft. The well has been producing from the Permian lime at 2,151 ft.

### DAILY AVERAGE PRODUCTION FOR WEEK

| | May 15 crude oil | May PAW quota all oils | May 8 crude oil |
|---|---|---|---|
| Arkansas | 72,100 | 73,000 | 71,350 |
| California | 778,500 | 822,700 | 774,750 |
| Colorado | 6,645 | 7,400 | 6,850 |
| Eastern fields | 97,200 | 115,700 | 83,850 |
| Illinois | 236,100 | 250,800 | 230,800 |
| Indiana | 15,250 | 16,000 | 14,100 |
| Kansas | 305,550 | 309,700 | 293,050 |
| Louisiana | 349,050 | 359,300 | 345,150 |
| *North Louisiana* | *87,000* | ..... | *87,000* |
| *Louisiana Gulf Coast* | *261,050* | ..... | *258,150* |
| Michigan | 61,100 | 62,100 | 60,400 |
| Mississippi | 52,450 | 50,000 | 54,550 |
| Montana | 19,950 | 24,600 | 23,770 |
| Nebraska | 2,000 | 2,400 | 2,000 |
| New Mexico | 103,500 | 105,700 | 104,000 |
| Oklahoma | 321,300 | 379,000 | 346,950 |
| Texas | 1,502,550 | 1,562,000 | 1,391,400 |
| *East Texas* | *339,300* | ..... | *319,800* |
| *West Central* | *226,750* | ..... | *214,500* |
| *North Central Texas* | *131,900* | ..... | *135,100* |
| *East Central Texas* | *124,300* | ..... | *99,850* |
| *Texas Panhandle* | *91,100* | ..... | *91,100* |
| *Texas Gulf Coast* | *513,950* | ..... | *458,050* |
| *Southwest Texas* | *75,250* | ..... | *73,000* |
| Wyoming | 91,740 | 97,000 | 97,800 |
| Total United States | 4,013,985 | 4,237,400 | 3,901,270 |
| Total production Jan. 1-May 15, 1943 | | 526,259,460 bbl. | |
| Same period last year | | 516,332,935 bbl. | |

### WEST TEXAS COMPLETIONS

#### Wildcats

Pecos County: Bryce McCandless 1 University, SW SE Sec. 20, Blk. 26, University Sur., elev. 2,629 ft., granite wash 4,850 ft., S.O. 2,176-80 ft., Ellenburger 5,180 ft., dry, T.D. 5,513 ft.

Tom Green County: Ohio Oil 1 L. T. Clark, NW NW Sec. 28, Blk. 5, H.&T.C.R.R. Sur., elev. 2,303 ft., San Angelo lime 1,200 ft., dry, T.D. 4,591 ft., shale.

#### Fields

Abell, Pecos County: Magnolia Pet. 3 State-Grove, 672 ft. from W, 648 ft. from S, Lot 7, Sec. 36, Blk. 9, H.&T.C. Sur., flow 801 bbl., dolomite pay 5,832 ft., T.D. 5,840 ft.

Byrd, Ward County: Stanolind Oil & Gas 2-A Dudley A. Wood, N¼ S¼ Sec. 34, Blk. 34, H.&T.C.R.R. Sur., I.P. 216 bbl., lime pay 2,585 ft., shot, T.D. 2,620 ft.

Embar-Ellenburger, Andrews County: Phillips Pet. 40 University-Andrews, SE SW Sec. 19, Blk. 10, University Sur., flow 1,596 bbl., perf. 8,000-14 ft., acid, T.D. 8,014 ft.

Goldsmith, Ector County: Atlantic Ref. 2-G H. E. Cummins, 1,816 ft. from E, 2,200 ft. from S, Sec. 26, Blk. 25, T-1s, T.&P. R.R. Sur., elev. 3,552 ft., I.P. 121 bbl., lime pay 4,206 ft., acid, T.D. 4,290 ft.

Sand Hills, Crane County: Magnolia Pet. 22 P. J. Lea, SW NW Sec. 9, Blk. 32, Public School Land, flow 836 bbl., lime pay 4,267 ft., T.D. 4,510 ft.

Slaughter, Cochran County: Devonian Oil 20-B Duggan, 510 ft. from S and W Lab. 21, Lge. 55, Oldham County School Land, flow 1,023 bbl., lime pay 5,002 ft., acid, T.D. 5,055 ft.

Slaughter, Hockley County: Tex. Pac. Coal & Oil 2 Rains County, 440 ft. from S and W Lab. 5, Lge. 42, Rains County School Land, flow 849 bbl., lime pay 4,885 ft., acid, T.D. 4,928 ft.

Magnolia Pet. 18-F Mallett, 580 ft. from S and W Lab. 8, Lge. 49, Edwards County School Land, flow 1,129 bbl., lime pay 4,980 ft., acid, T.D. 5,028 ft.

Taylor-Link, Pecos County: Arrow Drlg. 1 University, SW SW Sec. 34, Blk. 16, University Sur., dry, T.D. 1,802 ft.

Walker, Pecos County: Cardinal Oil 2-D University, NE SW SE Sec. 24, Blk. 16, University Sur., pump 38 bbl., 22 bbl. water, P.B. to 2,098 ft. from T.D. 2,164 ft.

Wasson, Yoakum County: Oil Dev. 4-38 fee, 440 ft. from N and E Sec. 38, Blk. AX, Public School Land, flow 1,386 bbl., lime pay 4,980 ft., acid, T.D. 5,046 ft.

West Fuhrman, Andrews County: Cities Service Oil 1-G University, SW SE Sec. 2, Blk. 10, University Sur., pump 84 bbl., lime pay 4,565 ft., shot, T.D. 4,604 ft.

Belfort Oil 1-B University, NE NW Sec. 15, Blk. 10, University Sur., I.P. 149 bbl., lime pay 4,385 ft., shot, T.D. 4,609 ft.

White & Baker, Pecos County: Cardinal Oil 6-L White & Baker, 1,670 ft. from N, 330 ft. from E, Sec. 90, Blk. 194, G.C.& S.F.R.R. Sur., flow 72 bbl., sand pay 1,904-28 ft., shot, T.D. 1,931 ft.

Winters, Runnels County: Pawnee Royalty 1 Emma Stoelker, NE NW Sec. 330, F. J. Ford Sur., dry, T.D. 2,784 ft.

#### Old Wells Drilled Deeper

McCamey, Upton County: Tex. Pac. Coal & Oil 18-A Lane, I.P. 220 bbl., old T.D. 2,034 ft., new T.D. 2,112 ft.

Tex. Pac. Coal & Oil 21-A Lane, Sec. 5, G.C.&S.F.R.R. Sur., I.P. 192 bbl., old T.D. 2,031 ft., new T.D. 2,100 ft.

Abell, Pecos County: Stanolind Oil & Gas 1 W. A. Wright, 50-ac. tract, Sec. 4, Blk. 3, H.&T.C.R.R. Sur., old T.D. 5,500 ft., new T.D. 5,913 ft., acid 1,000 gal., I.P. 259 bbl.

#### Workover

Taylor-Link, Pecos County: C. V. Lyman

(was Morris) 1 University, 990 ft. from N, 1,650 ft. from E, Sec. 24, Blk. 18, University Sur., elev. 2,585 ft., sand pay 979-91 ft., pump 10 bbl., shot 20 qt., T.D. 994 ft.

**PANHANDLE COMPLETIONS**

Carson County: Bell Oil & Gas 1 Byrum, 330 ft. from S and W, 80-ac. lease, Sec. 188, Blk. 3, H.&G.N. Sur., elev. 3,208 ft., I.P. 70 bbl., dolomite pay 3,180 ft., T.D. 3,296 ft.

Gray County: Texas Co. 1 Love, 1,326 ft. from N, 1,328 ft. from E, Sec. 27, Blk. 25, H.&G.N. Ry. Sur., elev. 2,740 ft., I.P. 3,417,000 cu. ft. gas, granite 2,405 ft., granite wash pay 2,309-29 ft., P.B. to 2,342 ft. from T.D. 2,459 ft.

Hutchinson County: Skelly Oil 2 Crosby-Hatcher, 330 ft. from N, 1,650 ft. from W, Sec. 3, Blk. M-24, T.C.R.R. Sur., I.P. 108 bbl., 39 bbl. water, lime and dolomite pay 3,266 ft., T.D. 3,280 ft.

Panhandle Prod. 5-B Herring, 3,320 ft. from S, 1,232 ft. from W, R. Walters Sur., elev. 3,352 ft., flow 612 bbl., pay 3,212 ft., T.D. 3,228 ft.

Gray County: Phillips Pet. 1 Step, 2,310 ft. from N and W, Sec. 197, Blk. B-2, elev. 3,266 ft., new I.P. 180 bbl., pay 3,036 ft., old T.D. 2,895 ft., new T.D. 3,150 ft.

**SOUTHEAST NEW MEXICO**

HOBBS, N. M. — R. Olsen Oil Co. Atlantic 1 Langlie, Section 11, 25s-37e, continued to disappoint on efforts to complete from Ordovician pays. Casing was perforated from 7,625-75 ft. with 59 shots, tested 2 hours with packer at 7,577 ft., and showed 3,500 ft. sulfur water. Perforations were squeezed, and the zone from 7,200-55 ft. will be perforated and tested.

**SOUTHEAST NEW MEXICO COMPLETIONS**

Leonard, Eddy County: Western Prod. 7-C Burch, NE SE 23-17s-29e, flow 300 bbl., lime pay 2,780 ft., acid, T.D. 2,929 ft.

Maljamar, Lea County: Barney Cockburn 5-B Pearl Miller, SE NE 23-17s-32e, flow 34 bbl., lime pay 4,180 ft., shot, T.D. 4,235 ft.

South Eunice, Lea County: Texas Pacific Coal & Oil 27-A State, SE SE 5-22s-36e, flow 624 bbl., lime pay 3,790 ft., acid, T.D. 3,872 ft.

## EASTERN TEXAS FIELDS

# Rodessa Formation Also Pays In Franklin County Discovery

DALLAS, Tex. — Tide Water Associated Oil Co. and Seaboard Oil Corp. 1 Bacon, Maximillian Survey, southern Franklin County, perforated with 78 shots from 7,295-7,305 ft. opposite Rodessa zone, and flowed 340 bbl. of 43-gravity oil through 5/32-in. choke. Previously the well had flowed 209 bbl. from the Travis Peak. In the Lake Franklin area of southwestern Franklin County, efforts were being made to deepen the failure completed last week by L. A. Grelling, Jr., to the Travis Peak. The well was halted at a total depth of 6,153 ft. in Paluxy water sand, but may be deepened through the Rodessa and Travis Peak zones producing in Tide Water and Seaboard 1 Bacon, 5 miles northeast.

**Cherokee County.**—L. O. McMillan 1 New Birmingham Development Co., 660 ft. from the north and west lines of 161-acre tract in Jordan Survey, 6 miles southwest of Rusk, reports top of Pecan Gap chalk at 3,935 ft. and was drilling below 4,025 ft. looking for the Woodbine sand.

**Robertson County.**—Magnolia Petroleum Co. 1 Pauline Doremus, Sam Kinne Survey, northwest of Calvert, had a slight show of oil in the Midway topped at 1,901 ft. and was drilling below 2,420 ft., logging top of Navarro at 2,070 ft.

**Kaufman County.**—Mae Belcher et al 1 Beulah Workman, new wildcat to test Woodbine 660 ft. from the northwest and southwest lines of 67.2-acre tract in N. Daugherty Survey, 4½ miles southwest of Kaufman, was spudded over the week end. Sun Oil 1 Rutledge, Parsons Survey, in northeast part of county, set 9⅝-in. casing at 4,031 ft. and was drilling below 4,400 ft. It is a Smackover lime test along the fault zone.

**Smith County.** — C. L. Wycliffe 1 Hackett, Samuel Leeper Survey, near Sand Flat, which showed favorable for production around 7,300 ft., was drilling below 8,850 ft., logging top of anhydrite at 8,520 ft.

**Wood County.**—Early development was seen for the new Cartwright pool, opened by Bobbie Manziel 1 Bailey, Burch Survey, as four locations for offsets were announced. Shell staked north offset, Magnolia south offset, Amerada northeast, and Sun southeast. McElreath & Suggett filed permit for their 1 School lot in 3-acre tract 1,300 ft. southwest of the discovery.

**EAST TEXAS COMPLETIONS**
**Wildcats**

Cherokee County: L. C. McMillan 1 So. Pine Lumber Co., 660 ft. E, 2,440 ft. N, SW cor. Edwin Harry Sur., elev. 275 ft., Pecan Gap 4,032 ft., Austin chalk 4,850 ft., Woodbine 5,150 ft., dry, T.D. 5,222 ft.

Franklin County: L. A. Grelling 1 Stanley, 339 ft. from W, 396 ft. from N, NW 40 ac., W. B. Jordan Sur., elev. 521 ft., Woodbine 4,378 ft., Paluxy 6,088 ft., dry, T.D. 6,155 ft.

Smith County: B. F. Phillips 1 Collier, 660 ft. from N and W 132-ac. tract, John Lonet Sur., dry, T.D. 2,800 ft.

Upshur County: H. H. Groneman 1 W. H. Johnson, 330 ft. from S and W 72-ac. tract, Wm. Williams Sur., dry, T.D. 3,976 ft.

**Fields**

Coke, Wood County: Amerada Pet. 1 T. D. Yates, 467 ft. from N and W 55.8-ac. tract or 1,000 ft. from E, 955 ft. from S, Jos. Knight Sur., elev. 513 ft., pump 91 bbl., Paluxy sand pay 6,346-57 ft., P.B. to 6,360 ft. from T.D. 6,383 ft.

Groesbeck, Limestone County: B. F. Weekley et al 1-A Addie Strother, 660 ft. from NE and SE 40-ac. tract, Wm. G. McKenzie Sur., elev. 457 ft., I.P. 5 bbl., 3,660,000 cu. ft. gas, Pettit pay 5,660-5,731 ft., acid., T.D. 5,768 ft.

Hawkins, Wood County: Humble Oil & Ref. 2 W. R. Parrish, 2,850 ft. from S, 910 ft. from W, H. E. Watson Sur., elev. 359 ft., Woodbine 3,998 ft., Georgetown 4,420 ft., dry, T.D. 4,451 ft.

Humble Oil & Ref. 2 Dick Parrish, elev. 408 ft., Woodbine 4,218 ft., flow 448 bbl., Woodbine sand pay 4,560-66 ft., T.D. 4,706 ft.

Humble Oil & Ref. 1 M. Greines, 467 ft. from S and W 99.93-ac. tract, T. S. McFarland Sur., dry, T.D. 4,987 ft.

Kildare, Cass County: C. C. Gilger Drlg. Co. 1 E. L. Davis, 747 ft. from E, 467 ft. from S, 50-ac. tract, or 1,800 ft. from W, 3,450 ft. from N, J. M. Watson Sur., elev. 307 ft., flow 166 bbl., Gloyd pay 6,078-84 ft., perf. 24 shots, P.B. to 6,090 ft. from T.D. 6,130 ft.

## MICHIGAN

### Osceola and Kawkawlin Furnish Good Production

SAGINAW, Mich.—May 17.—Sun Oil Co. completed another Evart field oil well good for 960 bbl. a day in Osceola Township, Osceola County, and Gulf Refining Co. got new production in wells completed in Kawkawlin and Monitor townships, Bay County, to headline development in Michigan oil fields last week. The only other completions were three dry holes, including a Calhoun County wildcat venture which failed after drilling to a depth of 4,286 ft.

Bringing the 1943 total to 153, the state Conservation Department approved eight drilling permits for tests in seven counties, two in Allegan, one each in Van Buren, Missaukee, Kent, Gladwin, Ottawa and Wayne.

P. J. Hoffmaster, state supervisor of wells, was hopeful that federal authorities will relax the requirement that oil wells be spaced no closer than one to each 40-acre unit. The relief is sought for a half dozen southern and western Michigan counties where shallow drilling is the rule in an effort to spur development.

**MICHIGAN COMPLETIONS**

Bay County, Kawkawlin Township: Gulf Refining Co. 2 Paige, N½ NW NW 34-15n-4e, pumped 50 bbl., acid, T.D. 2,934 ft.

Monitor Township: Gulf Refining Co. 1 Rechsteiner, S½ NE SE 3-14n-4e, pumped 80 bbl., acid, T.D. 2,921 ft.

Calhoun County, Albion Township: Continental Oil Co. 1 Turner, NE SE NE 15-3s-4w, wildcat test, dry, T.D. 4,286 ft.

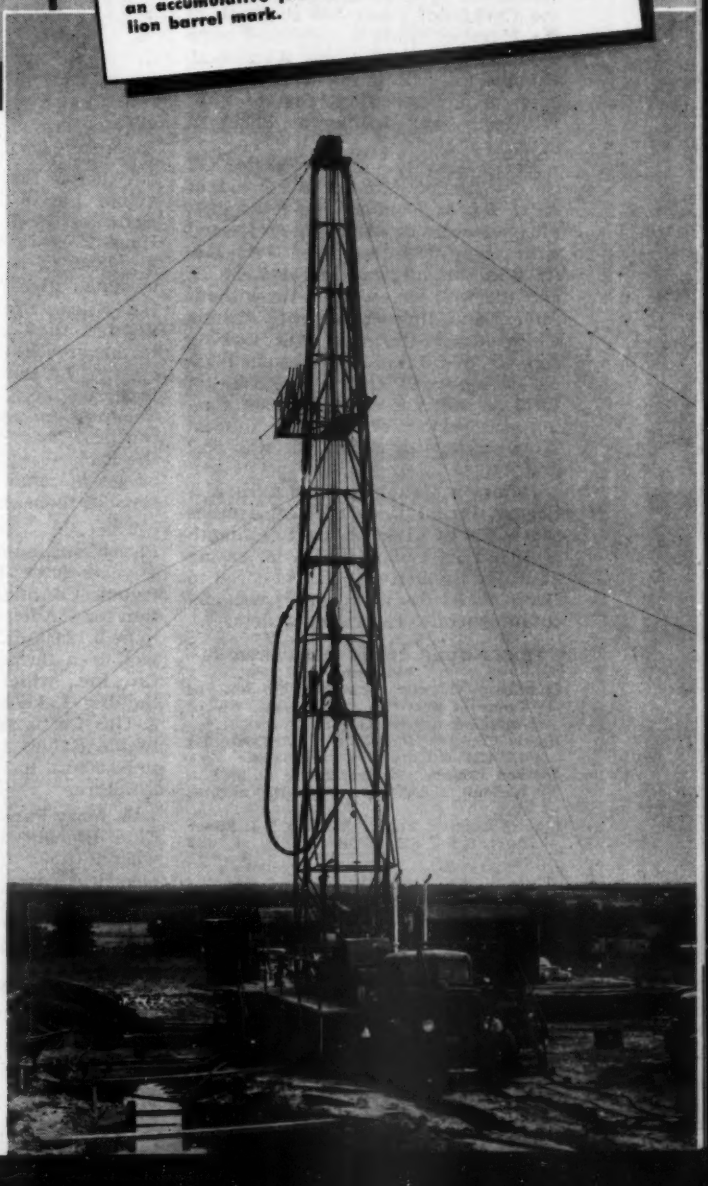
Osceola County, Osceola Township: Sun Oil Co. 4 Wickerham et al, N½ NW NE 28-18n-8w, 960 bbl., natural, T.D. 3,750 ft.

Van Buren County, Columbia Township: William H. Clock 1 Grimes, SW NW NW 30-1s-15w, dry, T.D. 1,134 ft.

# The New Method of Prospecting is by the "STRAT" Test—
# The Proven "STRAT" Equipment is FRANKS Slim Hole Rig—
# They Naturally Go Together

**Barada field, Richardson County, Nebraska, was discovered as a result of the drilling of a "Stratigraphic" test, Roesch 1, CN½ NW¼ 36-3N-16E. The well completed Oct. 23, 1941, in Hunton (Devonian) lime. Top of the pay was at 2432 while total depth was 2517 feet. On a 24-hour pumping test the well produced 615 barrels of 30 gravity crude.**

**Subsequent drilling of the anticlinal feature extended the field in all directions from the discovery, until ultimately defined by dry holes or minimum wells. Today, the field includes 13 producers . . . has an accumulative production approaching the half million barrel mark.**



**The value of the "STRAT" hole as a new exploratory tool is only beginning to be fully appreciated. Working entirely alone or as the full partner of another exploratory method, the "STRAT" is destined to play a part of progressively increasing importance in finding new reserves. It will add new fields in old areas—new prospects—new trends. "STRAT" holes will point to new geological provinces off the beaten path of today's wildcatting.**

**Franks truck-mounted "slim-hole" drilling rig is the most economical tool for the average "strat" test. It is the most completely portable rig on the market—complete with derrick, drawworks, pumps, rotary table and power plant all unitized on a truck. All you have to do is just back the truck into location, raise the derrick with the Franks patented power screw, guy the derrick, and you're ready for action. There are no pumps to hook-up or lines to string since they remain ready for action whether drilling or moving from location to location.**

**FRANKS MFG. CORP.**
**WELL SERVICING AND DRILLING UNITS**

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## TEXAS GULF COAST

# New Wilcox Test Starting In Montgomery County

HOUSTON, Tex.—Leading in interest among Gulf Coast drilling operations this week is Humble Oil & Refining Co. 1 Texas Long Leaf Lumber Co., wildcat test 1½ miles northwest of Splendora, in Montgomery County. Location is being cleared for a 12,000-ft. test to the Wilcox. The site is on a 3,000-acre tract in the Walker County School Land Survey, about 20 miles northeast of the prolific Humble field, in Harris County, opened in 1905, and almost the same distance southeast of the big Conroe field, opened in 1931 by George W. Strake. Previous wildcat ventures in the Splendora area have not been encouraging. One test, which went to the Cockfield, about 500 ft. south of the Humble location, produced some distillate and gas, but was abandoned. Humble's deep test in the Livingston area of Polk County, the 1 J. C. Whitforth, was drilling at 10,575 ft. in hard shale.

**Harris County.**—Cities Service Oil Co. 1 Witcher, 3 miles northeast of Alief, was still undergoing testing. At plugged-back depth of 7,931 ft. and with casing perforated at 7,924½-26½ ft., 2-in. tubing was set at 7,931 ft. and the well was washed in, without screen and liner being set. As the week closed, the well was flowing 3.24 bbl. of fluid hourly through 7/64-in. choke, with tubing pressure of 1,975 lb. and gas-oil ratio 2,800. Casing was sealed. A shakeout showed 27 per cent salt water. Oil was 36.2 gravity.

**Jefferson County.**—Glenn H. McCarthy, Inc., 1 Hebert Trust, 4 miles southwest of Viterbo, at a total depth of 10,084 ft., cemented 7⅝-in. casing at 10,041 ft., then drilled and cored to 10,060 ft. At the week end it was circulating while waiting on orders.

**TEXAS GULF COAST COMPLETIONS**

**Wildcats**

Chambers County: Standard Oil Co. of Texas et al 1-17D State, 5 mi. SW of Anahuac, dry at 9,119 ft.

Harris County: Humble 1 P. V. Cook, 3½ mi. NE of Katy, dry at 7,760 ft.

Jackson County: Stewart Boyle et al 1 J. Wendell, M.&C. Sur., A-232, dry at 5,152 ft.

Liberty County: Yegua Oil Corp. 1 J. Elmer Boyt, 6 mi. SE of Devers, dry at 7,995 ft.

**Fields**

Alta Loma, Galveston County: Stanolind 8 J. A. Hulen, A. Brigham Sur., A-5, dry at 9,182 ft.

Barbers Hill, Chambers County: Texas 10 Wilburn, H. Griffith Sur., A-12, O.W. W.O., old P.B. T.D. 4,030 ft., new P.B. T.D. 3,995 ft., 161 bbl. oil plus 45 per cent salt water through ¼-in. choke pumping, T.P. 125 to 0 lb., S.I. C.P. 375 lb., perf. 3,983-95 ft.

Blue Ridge, Fort Bend County: Phillips 1 Robinson - Bashara, Hicks - Shropshire Sur., dry at 5,605 ft.

Boling, Fort Bend County: Mackhank Petroleum Co. 16-C E. C. Farmer, J. Scott Sur., A-84, 520 bbl. through ¼-in. choke, T.P. 540 lb., C.P. 625 lb., gas-oil ratio 169, T.D. 4,569 ft.

Boling, Fort Bend County: Danciger Oil & Refining Co. 3 J. B. Gary, S. F. Austin Sur., dry at 3,620 ft.

Esperson, Liberty County: Fidelity Oil & Royalty Co. 1 B. E. Johnson, C. C. Brunson Sur., A-741, bbl. oil, with input pressure of 500 lb., jetting, perf. 6,935-50 ft., T.D. 7,618 ft.

Ganado, Jackson County: Texas 9 F. V. Tunison, M.&C. Sur., A-234, 117 bbl. through ⅛-in. choke, T.P. 150 lb., gas-oil ratio 810, perf. 6,450-58 ft., T.D. 6,575 ft.

Mustang Creek, Jackson County: Renwar Oil Corp. 1 Freeman, William Menefee Sur., A-53, O.W.D.D., old T.D. 6,651 ft., dry at new T.D. 6,706 ft.

South Anahuac, Chambers County: A. H. and C. L. Rowan 1 B. E. Quinn, E. Douthit Sur., A-329, dry at 9,129 ft.

Stowell, Jefferson County: Texas 1 T. F. Koch, E. Lopez lge., dual completion, from perf. 7,825-40 ft. 870 bbl., through ¼-in. by 6-in. chokes, T.P. 1,380 lb., gas-oil ratio 614; from perf. 7,500-15 ft. 261 bbl. through 11/64-in. choke, C.P. 1,725 lb., gas-oil ratio 2,015; T.D. 7,898 ft., P.B. 7,840½ ft.

West Ranch, Jackson County: Magnolia 248-A West Ranch, V. Garcia Sur., dry at 5,700 ft.

## LOUISIANA GULF COAST

# Reddell Prospect in Evangeline Parish Gets Another Try

NEW ORLEANS, La. — Interest in the old Reddell prospect in Evangeline Parish has been revived by Danciger Oil & Refining Co. 1 Hattie Haas, 22-4s-1w, which was approaching 3,000 ft. at the week end and is designed to make a thorough test of the Wilcox formation. Notwithstanding the number of dry holes drilled in this area in the past, many observers say the Danciger wildcat is likely to strike pay. Humble Oil & Refining Co. and Continental Oil Co. are among concerns that have experimented in the Reddell region without finding oil or gas in commercial volume, though some of them encountered shows.

The Big Lake field, in Cameron Parish, opened in 1935 and abandoned 4 years later, is to receive another tryout. Continental has staked location for 1 Adolph Hebert, Jr., planned to be a 12,000-ft. test in 18-12s-8w. The well is a farmout of Union Sulphur Co., Inc., which blocked and leased the Big Lake acreage. Stanolind Oil & Gas Co. is said to be contributing to the Hebert test. A wildcat drilled to 10,600 ft. in this area last year was a failure.

**St. Mary Parish.**—Texas Co. 4 State-Cote Blanche Island, in Bay-15s-7e, was at 8,303 ft. in sandy lime. An electrical survey is said to have disclosed likelihood of an oil sand to approximately 6,700 ft. In the North Jeannerette area Atlantic Refining Co. was delayed by a fishing job at its 1 Adeline Sugar Factory, 19-13s-9e. The hole, which bottoms at 12,211 ft., is reported to have produced an oil show at around 11,500 ft.

**La Fourche Parish.**—The Long Lake field has been extended to the south by Fohs Oil Co. 1 State lease 328-Hotard unit 2, in Lake-17s-19e. Initial production was 325 bbl. through 10/64-in. choke.

**Acadia Parish.** — Sun Oil Co. and Standard Oil Co. of Ohio 1 Daily, 7 miles west of Crowley, flowed 60 bbl. of distillate in 24 hours from perforations at 10,610-25 ft. During the first 12 hours it flowed 45 bbl. through ¼-in. choke, with tubing pressure 2,700 lb., casing pressure 1,850 lb. (packer leaking), and gas-distillate ratio 44,-333. Gas volume was at the rate of 1,999,500 cu. ft. daily. In the second 12 hours the well flowed 15 bbl. of distillate through ⅛-in. choke, with tubing pressures 3,360 lb., casing pressure 1,900 lb. (packer leaking), and gas-distillate ratio of 43,400. Gas volume was at the rate of 651,000 cu. ft. daily. Testing continued, through ¼-in. choke.

**LOUISIANA GULF COAST COMPLETIONS**

**Wildcats**

Calcasieu Parish: Union Sulphur Co., Inc., 1 W. T. Burton and Calcasieu National Bank, 24-11s-12w, dry at 10,163 ft.

**Fields**

Baton Rouge, East Baton Rouge Parish: William Helis et al 14 Harry B. Nelson, 37-7s-1w, 136 bbl. through 6/64-in. choke, T.P. 1,700 lb., gas-oil ratio 1,200, perf. 9,590-96 ft., T.D. 9,960 ft., new sand for this fields.

Bayou Blue, Iberville Parish: Navarro Oil Co. 2-B Wilbert Mineral Corp., 75-9s-10e, dry 5,293 ft.

Bayou Couba, St. Charles Parish: Gulf 3

Delta Securities Co., 13-15s-21e, 264 bbl. through 5/32-in. choke, T.P. 1,175 lb. gas-oil ratio 432, perf. 6,450-70 ft., T.D. 6,612 ft.

Bayou Sale, St. Mary Parish: Atlantic 2 St. Mary Parish Land Co., 41-17-9e, O.W. W.O., old P.B. T.D. 10,271 ft., squeezed all perf. and drilled out to original depth, 1,470,000 cu. ft. gas with spray of distillate through ⅛-in. choke, T.P. 3,700 lb., perf. 10,257-62 ft. (well shut in).

Bully Camp, La Fourche Parish: Texas Gulf Sulphur Co. 2 Delta Securities Co., Inc., 36-18s-20e, dry at 1,950 ft.

Grand Lake, Cameron Parish: Amerada 4 State Mallard, Bay-13s-4w, O.W.W.O., old T.D. 9,000 ft., new P.B. T.D. 8,695 ft., 170 bbl. through ⅛-in. choke, T.P. and C.P. 2,350 lb., gas-oil ratio 1,458 perf. 8,686-91 ft.

Lake de Cade, Terrebonne Parish: Superior Oil Co. 3 La Terre Co., Inc., 27-19s-15e, 97 bbl. through 6/64-in. choke, T.P. 1,750 lb., gas-oil ratio 773, perf. 10,202-08 ft., T.D. 10,653 ft. in sidetracked hole, P.B. 10,210 ft.

Lake Long, La Fourche Parish: Fohs Oil Co. State lease 328-Hotard unit 2, Lake-17s-19e, 325 bbl. through 10/64-in. choke, T.P. 1,200 lb., C.P. 575 lb., gas-oil ratio 600, perf. 9,382-90 ft., T.D. 9,409 ft.

Neale, Beauregard Parish: Atlantic 1-F Rice Land & Lumber Co., 27-3s-11w, 307 bbl. through ⅛-in. choke, T.P. 1,180 lb., gas-oil ratio 1,373, perf. 10,349-75 ft., T.D. 11,700 ft., P.B. 10,409 ft.

Atlantic 4 Ira Spiers, 26-3s-11w, 323 bbl. through ⅛-in. choke, T.P. 1,075 lb., gas-oil ratio 985, perf. 10,336-80 ft., T.D. 11,803 ft., P.B. 10,390 ft.

North Crowley, Acadia Parish: Humble 1 Mervine Kahn, 46-8s-1e, O.W.W.O., old T.D. 8,212 ft., new P.B. T.D. 7,980 ft., 336 bbl. through ⅛-in. choke, T.P. 1,100 lb., gas-oil ratio 792, perf. 7,970-74 ft.

Raceland, La Fourche Parish: Amerada et al 1 David Guidrez, 67-16s-19e, dry at 9,871 ft.

## N. CENTRAL TEXAS

# New Strawn Sand Pool Opened in Cooke County

WICHITA FALLS, Tex. — Snuggs, Seitz & McElreath 1 Percy McGeorge, 1,386 ft. from the south line and 1,319 ft. from the west line, Block 64, Fannin County School Land, south of Walnut Bend pool and 10 miles northeast of Gainesville, Cooke County, indicated a new Strawn sand pool when it filled 300 ft. in 9 minutes from 4,290-4,304 ft. The well is being carried on down to the Winger pay of the lower Strawn recently opened on east side of Walnut Bend, and if barren will be plugged back and completed at the shallower depth.

**Jack County.**—New Strawn pool for Jack County is Standard Oil Co. of Texas and Hanlon-Buchanan, Inc., 1 John W. Carter, Block 5, William McDonald Survey, 7 miles northeast of Jermyn, which made a flow after 20-qt. shot of nitro from 3,518-28 ft. The well was drilled to 6,040 ft. and plugged back to 3,538 ft. Taubert & McKee and Sinclair Prairie topped Ellenburger at 6,386 ft. in their 3 R. L. Boyd, Seth Hazel Survey, and had lime showing oil from 6,386-90 ft., indicating a west extension to the Taubert & McKee pool.

**Young County.**—Anderson-Prichard Oil Corp. et al 1 Jennie Latimer, Block 17, Young County School Land, Murray area, appeared to be the opener of a new Caddo lime pool when it cleaned itself and flowed into pits without a gage after treatment of 1,000 gal. acid from 3,635-46 ft. The same operators staked two new wildcat tests in the couuty, 1 W. T. Donnell, 4,900-ft. rotary test 2 miles southeast of Murray, 990 ft. from the northerly north line and 4,101 ft. from the west line, W. T. Donnell 1,046-acre tract in Margaret Edmonds Survey, and 1 J. C. McCorn et al, 9 miles west of Eliasville, 773 ft. from the east line and 1,278 ft. from the southerly southeast corner of the Robert Hewitt Survey.

### NORTH TEXAS COMPLETIONS

**Wildcats**

Archer County: Republic Nat. Gas 1 J. M. Powell, Wm. Henry Sur., S.S.O. 1,337-40 ft., dry, T.D. 1,446 ft., shale.

White & Duncan 1 C. L. Abercrombie, Lot 94, Blk. 4, C.&P. subd., dry, T.D. 1,305 ft.

W. H. Spradling 1 T. P. Duncan, Blk. 15, Bacon subd., dry, T.D. 1,200 ft.

Grayson County: Burk Roy. 1 Wm. Freeman, 330 ft. from N and W, W. S. Reeves Sur., pump 10 bbl., granite wash pay 1,377 ft., T.D. 1,384 ft. Discovery.

Jack County: Rathke Oil 1 S. Jagoda, O.W. W.O., 660 ft. from S and W, R. Erwin Sur., pump 7 bbl., lime pay 4,471-4,534 ft., P.B. to 4,534 ft. from T.D. 4,802 ft. Discovery.

Wichita County: Gorman & Metzner 1 W. C. Parker, Sec. 23, Palo Pinto County School Land, dry, T.D. 1,336 ft.

**Fields**

Allar, Young County: Burk Roy. 2 Allar Co., 467 ft. from S, 2,300 ft. from W, Sec. 3409, T.E.&L. Sur., dry, T.D. 3,607 ft.

Archer County: White & Duncan 1 A. F. Ickert, Wm. Ainsworth Sur., dry, T.D. 1,305 ft.

Hoefle, Jack County: Hanlon-Buchanan, Inc., 1-C Ellis & DuBose, 2,759 ft. from S, 5,111 ft. from W, J. W. Williams Sur., flow 163 bbl., lime pay 4,920 ft., acid, T.D. 5,025 ft.

Hanlon-Buchanan, Inc., 1 E. E. Farris, 467 ft. from N, 495 ft. from W, 225-ac. tract, J. S. Porter Sur., pump 15 bbl., lime pay 4,934-49 ft., perf., T.D. 5,065 ft.

Hanlon-Buchanan, Inc., 1 M. H. Leach, 495 ft. from S and E, 236.5-ac. tract, J. S. Porter Sur., pump 65 bbl., Strawn lime pay 2,710-28 ft., acid, P.B. to 2,728 ft. from T.D. 5,953 ft. New pay.

Standard Oil Co. of Texas and Hanlon-Buchanan, Inc., 1-A J. B. Jackson, 550 ft. from N and W, W 80 ac. of NW Sec. 1, S.P.R.R. Sur., elev. 1,121 ft., Caddo 4,863 ft., Ellenburger 5,900-19 ft., pump 35 bbl., 25 per cent water, pay 4,945 ft., acid, P.B. to 4,963 ft. from T.D. 6,060 ft.

Pottsboro, Grayson County: Burk Roy. 2 Wm. Freeman, 1,320 ft. E of No. 1, W. S. Reeves Sur., dry, no shows, T.D. 1,430 ft.

Rogers & Rogers, Montague County: Stanolind Oil & Gas 2-B C. P. Dodson, 1,263 ft. from S, 423 ft. from W, 135.65-ac. tract, E.T.R.R. Sur., flow 1,392 bbl., conglomerate pay 5,124 ft., T.D. 5,137 ft.

Steed & Cooper, Jack County: Paul P. Steed et al 1 G. L. Jones, 1,216 ft. from N, 786 ft. from E, NW Sec. 2, B.S.&F. Sur., flow 126 bbl., pay 2,919 ft. sand, T.D. 2,934 ft.

Talbot, Young County: Talbot & Schmitz 3 Pauline Ferguson, 495 ft. from S and W, S. Tynes Sur., A-274, elev. 1,170 ft., Caddo 4,283 ft., S.S.O. 4,285-91 ft., dry, T.D. 4,480 ft.

Thornberry, Clay County: Sussex Oil 1 Chapin, Blk. 81, Byers Bros. subd., dry, T.D. 1,189 ft.

Vogtsberger, Archer County: Tom Medders 1 Peter Berger, 467 ft. from S and E, German Emigration Sur., elev. 965 ft., flow 580 bbl., pay 4,759 ft., T.D. 4,815 ft.

Walnut Bend, Cooke County: Sun Oil 2 Maggie Bacon, 955 ft. from S, 330 ft. from W, Blk. 70, Fannin County School Land, elev. 769 ft., flow 1,276 bbl., Winger pay 5,435-5,510 ft., T.D. 5,519 ft.

Wichita County: F. H. Gohlke 1-A P. Bilbrey, Blk. 11, Pratt subd., dry, T.D. 1,251 ft.

Young County: B. D. Donnell 1 L. F. Gragg, A. Rohus Sur., dry, T.D. 867 ft.

M. R. Stipe 1 Ben Schlegel, Sec. 74, T.E.&L. Sur., dry, T.D. 1,140 ft.

**Old Well Drilled Deeper**

Montague County: Continental Oil et al 6 S. J. Hott, Ed O'Conner Sur., new I.P. 66 bbl., pay 1,804-08 ft., old T.D. 1,651 ft., new T.D. 1,808 ft.

## WEST CENTRAL TEXAS

ABILENE, Tex. — Sohio Oil Co. 1 Cresswell, Section 92, Block 2, G.H. &H. Ry. Survey, northwestern Coleman County, had sand showing oil from 2,635-37 ft. and was coring ahead. It is an Ellenburger test. New wildcat for Jones County is Harold G. Neely et al 1 Hayden, 330 ft. from the south and east lines of NE¼ Lot 1, Block 5, G. Martinez Survey 195, 4 miles north of Hawley.

### WEST CENTRAL TEXAS COMPLETIONS

**Wildcats**

Comanche County: P. S. Groginski 1 R. A. Folkner, 1,000 ft. from N, 330 ft. from E, Sec. 3, E.T.R.R. Sur., dry, T.D. 702 ft.

Jones County: Fain & McGaha et al 1 J. H. Patterson, 330 ft. from N and W, NE 152-ac. of Sec. 20, Blk. 17, T.&P. Ry. Sur., elev. 1,752 ft., pump 58 bbl., 8 bbl. water, Tannehill sand pay 2,195 ft., T.D. 2,203 ft. Discovery.

Butler & Horne et al 1 Lee, 330 ft. from N and W, SE 40-ac. of 199-ac. tract, Lot 3, S. J. Winters Sur., dry, T.D. 1,846 ft.

Hedrick Oil 1 H. Arnwine, 330 ft. from N and E 200-ac. tract, G. Martinez Sur. 137, dry, T.D. 2,229 ft. sand.

Palo Pinto County: H. R. Montgomery 1 Helen Johnson, 2,560 ft. from SW, 330 ft. from NW, B. McNelly Sur. A-329, Ellenburger 4,857 ft., dry, T.D. 4,862 ft.

**Fields**

Bluff Creek, Shackelford County: Roeser & Pendleton et al 53 J. P. Morris, NE NE SW Sec. 205, E.T.R.R. Sur., pump 74 bbl., pay 1,579 ft., T.D. 1,599 ft.

Caddo, Stephens County: Beacon O. & R. 1 J. Q. Corbett, 467 ft. from S and E, John Hopkins Sur., Mississippi lime 4,410 ft., dry, T.D. 4,625 ft.

Cook, Shackelford County: Roeser & Pendleton et al 1-B-117 W. I. Cook est., 990

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## ROCKY MOUNTAIN AREA

# Tensleep at Elk Basin Gets Rapid Development

DENVER, Colo. — In the absence of outstanding developments for the week in the Rocky Mountain area, interest has been centered on drilling wells in the Elk Basin field which will indicate the extent of the productive area in the new Tensleep horizon. So far the wells completed have been close in around the discovery, and although some experts estimate that 4,000 acres are certain to be productive, the accuracy of these predictions remain undetermined by the drill. The surface geology shows the area to be extensively faulted, but whether the faults continue down to the Tensleep horizon is still an unanswered question. The test nearest to the objective is the Ohio Oil Co. 3 Mack-OPC-7, NE NW NW 31-58-99, ¾ mile west of the discovery, and separated from same by several small faults. At last reports it was drilling at 4,694 ft. and is reported running around 100 ft. lower than expected. Yale Oil Corp. 1 Watson, still farther out and ½ mile to the southwest, is not yet deep enough to indicate results. Stanolind 1 Dengler, 3 miles to the north and on the Montana side, is drilling at 3,400 ft. and is due to reach the top of the Tensleep at around 4,700 ft. The locations of the drilling wells are widely scattered with only one at the approximate apex of the structure.

**Oregon Basin extension.** — Husky Refining Co. 5 Orchard, which made 185 bl. initial from the Embar-Tensleep horizons, extends the proven area at Oregon Basin approximately ⅛ mile to the east. It is located on the northeast side of the south dome, the nearest producer being Charles E. Orchard 2 Rue, NW SW SW Section 28, which was completed in 1928 for 250 bbl. natural.

**Arizona test.** — The Argo Oil Corp. has released a location for its 1 State, NE NE 22-15n-29e, on the Zuni structure, Apache County, Arizona. It is in the northeast corner of the state, just south of the Utah line and directly west of the Rattlesnake field in Northwest New Mexico. It will go to the Pennsylvanian. Midwest Oil and Saltmont companies have joint interest in the test.

**Weskan test abandoned.**—Broderick & Gordon 1 Goodrich, NE NE 9-14s-42w, Wallace County, Kansas, 4 miles east of the Colorado line and on a Stanolind farmout, has been abandoned after testing shows at 4,464 to 4,800 ft. in the Lansing. Last depth reported was 5,477 ft., the top of the Mississippian being at 5,106 ft.

**Northwest New Mexico test.**—Continental Oil Co. is moving in for its 1 Bi-clah-bi-to unit, NE SW NW 13-30n-21w, on the Bi-clah-bi-to structure, San Juan County. It is a joint operation with the Stanolind Oil & Gas Co. and the Standard Oil Co. of Texas on a block of 3,120 acres of Navajo Indian Reservation land. It will explore the Pennsylvanian at a total depth of 4,500 ft. This is the second of two tests the joint interests contracted to drill when the Indian leases were purchased last August. The other was on the Tocito dome which is listed as a completion this week for 2,000,000 cu. ft. of noninflammable gas, and which the Government has taken over.

**Montana Devonian test.**—R. C. Tarrant 1 Wood, C NE NW 32-28n-1w, Midway district, Pondera County, which is headed for the Devonian at around 2,750 ft., is drilling at 2,200 ft. in a wet hole and is reported to have shown oil in the cuttings from a break in the Madison lime at 2,115-25 ft., but no test was made. It had a show of 43° oil in the first 10 ft. of the Sunburst sand at 1,690-1,720 ft. It is the first Devonian test in the central part of the Sweetgrass arch.

#### WYOMING COMPLETIONS

Oregon Basin, Park County: Husky Refining Co. 5 Orchard, NW SE SW 28-51n-100w, T.D. 4,061 ft., 7-in. 4,059 ft., top Embar 3,687 ft., top Tensleep 3,955 ft., perf. opposite Embar, 185 bbl. per day.

#### MONTANA COMPLETIONS

Cut Bank, Glacier County: Santa Rita Oil & Gas Co. 3 Hardy, C SE NW 27-35n-6w, T.D. 2,949 ft., 7-in. 2,896 ft., Cut Bank sand 2,870-2,939 ft., main pay 2,903-39 ft., 1,000 ft. oil in hole, swabbed 45 bbl.

Kevin-Sunburst, Toole County: G. M. Plotke 5 Ward, SE NE NE 29-35n-3w, T.D. 1,711 ft., contact 1,706 ft., show oil, acid. 1,000 gal., 20 bbl. per day.

J. H. Agen 7 Goeddertz, NW NE SE 16-35n-3w, T.D. 1,805 ft., little gas in Sunburst at 1,495-1,520 ft., contact dry at 1,772 ft., abandoned.

#### NORTHWEST NEW MEXICO COMPLETIONS

Tocito, San Juan County: Continental Oil Co. 1 Tocito, SW SW NE 17-26n-18w (unsurveyed), T.D. 6,919 ft. in quartzite, P.B. to 6,700 ft., 7-in. 6,648 ft., 2,000,000 cu. ft. gas with some water, turned back to the Government.

## CANADIAN FIELDS

### Four Completions Reported In Turner Valley

CHATHAM, Ont. — In the north extension of Turner Valley, Northwest-Hudson's Bay 10, LSD 11, 8-21-3w5, finished at 8,711 ft. with Madison limestone at 8,240 ft., had initial production of 1,091 bbl. daily of 42° crude with 1,173,000 cu. ft. of gas, after acidizing. Northclonmel Petroleum 1, LSD 16, 7-21-3w5, a west-flank well, finished at 8,850 ft. with Madison at 8,459 ft., was acidized, producing 186 bbl. of 40° crude with 223,000 cu. ft. of gas.

In North Turner Valley, Foothills Oil & Gas 14, LSD 6, 27-20-3w5, finished at 7,726 ft. with Madison at 6,954 ft., was acidized, producing 532 bbl. daily of 41.1° crude with 1,307,000 cu. ft. of gas.

In the southwest-extension area, Northwest-Hudson's Bay 12, LSD 8, 8-18-2w5, finished at 7,764 ft. with Madison at 7,242 ft., was acidized, producing 773 bbl. daily of 41.5° crude with 1,160,000 cu. ft. of gas.

In the north extension, National-Vulcan 1, LSD 15, 5-21-3w5, west-flank well, finished at 8,740 ft. with Madison lime at 8,565 ft., made 185 bbl. daily after initial acid treatments in the upper porous zone, and is continuing production tests.

**Kinsella.** — In the Kinsella field, East Central Alberta, General Petroleums-Kinsella 1, LSD 16, 29-44-8w4, finished drilling in the Lower Cretaceous formation at 1,975 ft. Promising oil horizons were encountered at 1,520, 1,720 and 1,840 ft. Casing is cemented and gun-perforation tests will be made in the porous zones. A second test is to be drilled. The Kinsella field has been a large gas producer, but the General Petroleums test is primarily for oil.

**Armelgra.** — In the Armelgra area, southern Alberta, Imperial-Armelgra 1, LSD 16, 19-13-13w4, is rigging pump for a definite production test of the Ellis sand between 3,100-24 ft. Test was carried into the lime at 3,131 ft. but encountered water, and the lime was cemented off for a test of the Ellis. Initial shows in this horizon indicated a commercial well.

**Sullivan Creek.** — On the Sullivan Creek structure, 40 miles west of South Turner Valley, Sullivan Creek Syndicate 1, LSD 13, 25-17-5w5, got the Madison limestone at 2,375 ft. and will drill into the upper porous zone and test production before cementing casing. The Madison was found about 600 ft. deeper than anticipated, but considerably higher than in Turner Valley, and if the lime horizons are similar in the two fields, the first production should be encountered around 2,500 to 2,600 ft. Test is sponsored by a group of Turner Valley companies, headed by Anglo-Canadian Oil Co.

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# OHIO, KENTUCKY

## Wildcat Near Cambridge Shows Gas in Clinton

ZANESVILLE, Ohio.—The Ohio Oil wildcat near Cambridge reached the Clinton sand at 5,288 ft. A show of gas was found in the Red Clinton at 5,372 ft. The well will be drilled 50 ft. in the Red Medina before further testing. H. C. Bishop completed his well in the Wellington pool at 3,220,000 cu. ft. There are now 10 producers in the pool ranging in volume up to 13,000,000 cu. ft. The Industrial Gas Corp. completed a 150-bbl. oil well in Newton Township 6 miles northeast of the Clayton pool. The Preston Oil Co. has made six additional locations in the Clayton pool.

**OHIO COMPLETIONS**

Athens County, Carthage Township: C. A. Cody 5 E. M. McLead, Sec. 26, Maxon, 75,000 cu. ft., T.D. 1,210 ft.

York Township: Porter et al 1 John Herrold, Sec. 30, Berea, dry, T.D. 830 ft.

Coshocton County, Clark Township: Ohio Oil 1 B. W. Schoffer, Lot 21, Clinton, 8 bbl., T.D. 3,317 ft.

Monroe Township: Upham Gas 1 Fred W. Still, Sec. 5, Clinton, dry, T.D. 3,508 ft.

Fairfield County, Berne Township: City Nat. Gas 1 James Stump, Sec. 23, Clinton, 50,000 cu. ft. gas, T.D. 2,270 ft.

Guernsey County, Wheeling Township: Ohio Fuel 1 C. L. Miller, Sec. 15, Oriskany, 929,000 cu. ft. gas, T.D. 3,241 ft.

Lorain County, Huntington Township: H. C. Bishop 1 John Sidle, Lot 1, Clinton, 3,220,000 cu. ft. gas, T.D. 2,434 ft.

Harmon et al 2 M. E. Holmes, Lot 2, Clinton, dry, T.D. 2,510 ft.

Meigs County, Bedford Township: Ohio Fuel 3 Clay Wilson, Sec. 4, Berea, 157,000 cu. ft. gas, T.D. 1,735 ft.

Morgan County, Homer Township: D. T. Orndoff 5 Sarah V. Dale, Sec. 2, Berea, 50,000 cu. ft. gas, T.D. 1,315 ft.

Malta Township: Industrial Gas 1 Emma Gillespie, Sec. 32, Clinton, 250,000 cu. ft. gas, T.D. 4,460 ft.

Muskingum County, Newton Township: Industrial Gas 2 Alice E. Bagley, Sec. 7, 150 bbl., T.D. 3,480 ft.

Noble County, Seneca Township: J. & W. Gas 3 J. J. Groves, Sec. 27, Berea, 19,882 cu. ft. gas, T.D. 1,631 ft.

Perry County, Harrison Township: Foraker et al 2 Geo. Allen, Sec. 28, Clinton, 10 bbl., T.D. 3,531 ft.

Stark County, Bethlehem Township: Hanley and Bird 1 P. K. Goughnour, Sec. 14, Clinton, dry, T.D. 4,691 ft.

Washington County, Barlow Township: D. T. Orndoff 10 M. G. Bell, stray, dry, T.D. 1,286 ft.

Wayne County, Clinton Township: Ohio Fuel 2 A. J. Metcalf, Sec. 24, Clinton, 744,000 cu. ft. gas, T.D. 3,133 ft.

### WESTERN KENTUCKY

OWENSBORO, Ky.—The discovery well of Miller, Shiarella and Ashland Oil Refining Co. 1 T. Miller, 1½ miles northeast of the town of Cleopatra, Daviess County, continued testing through the week showing for a good producer from Benoist sand. It looked good for 175 bbl. a day.

**WESTERN KENTUCKY COMPLETIONS**
**Wildcats**

Henderson County: Nash Redwine 1 R. A. Boyster, near Dixon, dry at 2,655 ft., Glen Dean 1,958 ft., Barlow 2,212 ft., Paint Creek 2,311 ft., Benoist 2,375 ft., Ste. Genevieve 2,522 ft.

Creekmore, Rooney, Walker 1 Priest, dry at 2,384 ft., Glen Dean 1,599 ft., Cypress 1,845 ft., Benoist 2,017 ft., Renault 2,059 ft., Ste. Genevieve 2,146 ft., St. Louis 2,368 ft.

Calstar 1 Dorriott, dry 2,675 ft., Glen Dean tops 2,006 and 2,021 ft., Barlow 2,307 ft., Ste. Genevieve 2,570 ft.

**INDIANA COMPLETIONS**

Gibson County: R. D. Braun 2 Mahan, NE NW SW 36-1s-10w, dry at 1,841 ft.

Posey County: Central States 5 Hermson, SE SE NW 30-6s-12w, pumped 20 bbl., Waltersburg sand 1,880-1,918 ft.

Spencer County: Dameron-Gary-Savage 1 A. Frank, NE NW SW 36-7s-7w, pumped 120 bbl., Palestine sand 932-47 ft., T.D. Pool opener.

Vanderburg County: United Oil 3 Stader, SW SE NW 32-6s-11w, pumped 75 bbl., Waltersburg sand 1,733-41 ft., T.D.

## West Central Texas

*(Continued from Page 113)*

ft. from S, 1,650 ft. from E, Sec. 117, E.T.R.R. Sur., dry, T.D. 1,735 ft.

Eliasville, Stephens County: Texas Pacific Coal & Oil 13 S. H. Hill, 800 ft. from NE, 626 ft. from SE, Sec. 1122, T.E.&L. Sur., flow 1,290 ft., Mississippi lime pay 4,245 ft., T.D. 4,254 ft.

Putnam, Callahan County: W. M. Gamblin 1-A Henson Wagley, NW SW SW Sec. 2929, E.T.&L. Sur., dry, T.D. 375 ft.

Shackelford County: W. S. Merrick et al 2 Pittman & Reynolds, 660 ft. from SE, 1,300 ft. from NE, Sec. 541, T.E.&L. Sur., dry, T.D. 725 ft.

Wimberly, Jones County: Butler & Horne 3 O. D. Fikes, 330 ft. from S and E, Blk. 105, Lge. 126, De Witt County School Land, flow 658 ft., pay 2,222 ft., T.D. 2,228 ft.


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MAIN OFFICES: 1102 GULF STATES BLDG.

DALLAS, TEXAS

Central Warehouse: Valley Park, Missouri

## ILLINOIS

### Two Pools in Wabash And Jefferson Counties

CENTRALIA, Ill.—Two pools were opened in Illinois in the past week, one in Wabash County by Superior Oil Co. in 9-1s-12w, and the other in Jefferson County by Seaboard Oil Co. in 3-4s-3e. Neither discovery well was a large producer and both showed water with the oil.

Twenty oil wells and 10 dry holes were completed during the week.

Forty-two new operations were reported in the state, including eight wildcats: N. W. Whitten 1 Alfred Rott, SW SW SE 13-1s-9w, St. Clair County; E. S. Adkins 1 Biggs-S, SE SE NE 25-7s-2e, Franklin County; J. V. Canterbury 1 J. K. Klinger, SW SW NW 36-5n-8e, Clay County; Skelly Oil and Nelson Development 1-A Grumbell, SE SE SW 3-1s-10e, Edwards County; Dee Miller Drilling Co. 1 Coleman, NE SE SW 6-4s-11e, White County; Big Chief Drilling 1 Hanis, SE SW SE 22-1n-2e, Marion County; Rea-Powers Powless, NE NW SE 13-1n-5e, Wayne County; Eason-Moulton 1 Breeze Bank, NW SW SW 36-3n-4w, Clinton County.

**ILLINOIS COMPLETIONS**

**Wildcats**

Clay County: Northern Ordnance, Inc. 1-D Sapp, C SW SE 5-2n-5e, dry at 4,696 ft., upper Kincaid 1,817 ft., lower Kincaid 1,916 ft., Menard 2,117 ft., Tar Springs 2,248 ft., Glen Dean 2,345 ft., Golconda 2,427 ft., Barlow 2,524 ft., Cypress 2,585 ft., Benoist 2,716 ft., Renault 2,770 ft., Aux Vases 2,809 ft., Ste. Genevieve 2,836 ft., McClosky 2,960 ft., Osage 4,064 ft., Louisiana 4,328 ft., Devonian 4,510 ft.

Fayette County: Bonnie Heath 1 Glueskamp, SW SW SW 26-6n-3e, dry at 2,230 ft., Menard 1,513 ft., upper Glen Dean 1,678 ft., Golconda 1,727 ft., Barlow 1,803 ft., Cypress 1,821 ft., Paint Creek 1,921 ft., Benoist 2,003 ft., Benoist sand 2,018 ft., Aux Vases 2,074 ft., Ste. Genevieve 2,127 ft.

Franklin County: E. S. Adkins 2 Orient Coal, NE SE SE 13-7s-2e, dry at 2,996 ft., Fredonia lime 2,833 ft., McClosky at 2,872-75 ft.

Franklin County: Kingwood 1 Valier Coal Co., NE NE SE 17-6s-2e, dry at 2,870 ft., Kincaid 1,568 ft., lower Menard 1,842 ft., Vienna 1,952 ft., Tar Springs 1,972 ft., Glen Dean 2,118 ft., Hardinsburg 2,144 ft., Golconda 2,204 ft., Barlow 2,340 ft., Cypress 2,378 ft. and 2,471 ft., Paint Creek lime 2,471 ft., lower Paint Creek 2,524 ft., upper Renault 2,638 ft., Ste. Genevieve 2,698 ft., Fredonia 2,777 ft., no McClosky, St. Louis 2,864 ft.

Jefferson County: Seaboard 1 Eldridge, NE SE NE 3-4s-3e, southeast of the King pool, pumped 53 bbl. of oil and 8 bbl. of water from Rosiclare sand topped at 2,872 ft., T.D. 2,907 ft. Pool opener.

Lawrence County: C. F. Ross 1 Blair, SW NW SW 25-2n-12w, casing collapsed at 790 ft., junked.

DeKalb et al 1 Leah King, SE NE SE 8-2n-12w, dry at 1,450 ft.

R. S. Young 1 Carlton, Hershey, NE NW SE 34-2n-12w, dry at 2,105 ft., upper Glen Dean 1,710 ft., Barlow 1,868 ft., Paint Creek 1,996 ft., Benoist 2,025-50 ft.

Marion County: Algona Oil 1 Stater, NE SE NW 16-1n-1e, dry at 1,685 ft., Glen Dean 1,458 ft., Golconda 1,540 ft., Barlow 1,648 ft., Cypress 1,662-85 ft.

Richland County: E. A. Myers, C SE NW 31-3n-9e, dry at 3,173 ft., McClosky 3,028-35 ft. and 3,047-48 ft., tested salt water.

Wabash County: Superior 1 Viekman, NW SW NW 9-1s-12w, pumped 75 bbl. oil and 4½ bbl. water, Biehl sand at 1,504-21 ft. with show of oil, saturated Benoist sand 2,164-2,206 ft., T.D. 2,403 ft., P.B. to 2,191 ft. Pool opener.

White County: R. W. Slemaker 1-A Ackerman, NW NW NE 21-5s-10e, dry at 3,237 ft., upper Kincaid 1,895 ft., lower Kincaid 2,016 ft., Menard 2,245 ft., Vienna 2,378 ft., Tar Springs 2,382 ft., upper Glen Dean 2,496 ft., lower Glen Dean 2,526 ft., Golconda 2,602 ft., Barlow 2,726 ft., Cypress 2,752 ft., Benoist 2,902 ft., lower Renault 3,005 ft., Aux Vases 3,016 ft., Ste. Genevieve 3,048 ft., Fredonia 3,081 ft., St. Louis 3,265 ft.

**Fields**

Bible Grove, Effingham County: C. W. Crump 1 J. Hobbs, SE SE SW 33-6n-7e, pumped 132 bbl. Cypress sand 2,510-23 ft., T.D. 2,524 ft.

Texas 2 Bloemker Community: SW NW SW 3-5n-7e, pumped 87 bbl., Weiler sand 2,523-32 ft., T.D. 2,534 ft.

Blairsville, Hamilton County: J. W. Menhall 1 Hammond, NW NW NW 20-4s-7e, dry 3,066 ft., Cypress 2,762 ft., Weiler 2,773 ft., Aux Vases 3,060-61 ft.

Coil, Wayne County: C. R. Ross 1 Gregory-Morris, SE SE SW 18-1s-5e, dry at 2,935 ft., Renault 2,886 ft., Aux Vases 2,907 ft.

Clay City, Clay and Wayne counties: Pure 1 Mary Hunt, NW SW SE 35-2n-7e, swabbed 99 bbl. first day, 114 bbl. second day, pumped 182 bbl. third day, pumped 114 bbl. fourth day; Aux Vases sand 2,916-37 ft., shot; T.D. 2,937 ft.

Flora, Clay County: Tide Water 2 Wenka, C NW SW 13-3n-6e, pumped 63 bbl. first day, 48 bbl. second day, 46 bbl. third day; McClosky lime 2,964-72 ft. and 2,977-82 ft., T.D. 2,987 ft.

Iola, Effingham County: Carter Oil 2 Vanheisen, NE NE SE 15-5n-5e, pumped 213 bbl. oil and 21 bbl. water; Benoist sand 2,286-2,306 ft., Aux Vases sand 2,334-55 ft., T.D.

Texas 1 Buhrman Kidwell, NE SW NW 15-5n-5e, pumped 80 bbl. oil and 2 bbl. water; Benoist sand 2,286-2,326 ft., Aux Vases sand 2,344-55 ft., T.D. 2,356 ft.

Johnsonville, Wayne County: Braun et al 1 Bailey, C N½ NE SE 26-1n-6e, old well deepened from 3,069 to 3,138 ft., pumped 240 bbl., pipe perforated at 3,128-32 ft.; lower O'Hara at 3,132-38 ft. acidized.

King, Jefferson County: Texas 1 Wilkerson, SW NE SE 28-3s-3e, pumped 14 bbl. Aux Vases sand 2,708-41 ft., shot at 2,730-40 ft., T.D. 2,778 ft.

Lewis Production 2 State Game Farm, SW SE NE 28-3s-3e, dry at 2,757 ft., upper Glen Dean 2,232 ft., lower Glen Dean 2,245 ft., Barlow 2,438 ft., Cypress 2,468 ft., Paint Creek 2,543 ft., Benoist sand 2,636 ft., Renault 2,691 ft., Aux Vases 2,706 ft.

Nash Redwine 2 S. M. Story, NE SE SW 34-3s-3e, pumped 404 bbl., Aux Vases sand 2,708-24 ft., shot, T.D. 2,724 ft.

Markham City-Bluford, Jefferson County: E. Wix 1 Ed Nelson, C W½ SW NW 36-2s-4e, pumped 120 bbl. oil and 20 bbl. water McClosky lime 3,051-55 ft., acidized, T.D. 3,055 ft.

Mount Erie, Wayne County: Southern Operating Co. 2 Anderson, C N½ NE NW 2-1s-8e, dry at 2,996 ft., Aux Vases top 2,979 ft., shot at 2,984-96 ft.

North Inman, Gallatin County: Carter Oil 4 J. Crawford, SW SE NE 11-8s-10e, pumped 73 bbl., Tar Springs sand 2,049-65 ft., shot, T.D. 2,066 ft.

North Sims, Wayne County: Pure 2 Elmer Barnard, NE SE NW 17-1s-6e, pumped 33 bbl., Aux Vases sand 3,011-34 ft., T.D.

Carter Oil 1 C. Goff, NE SW SW 17-1s-6e, pumped 120 bbl. oil and 2 bbl. water, Aux Vases sand 3,034-48 ft., T.D. 3,049 ft.

Patton, Lawrence County: L. S. Heath 2 A. Bye, NE NE SE 27-2n-12w, pumped 125

*(Continued on Page 120)*

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## OKLAHOMA

# Cimarron Added to State's Producing Counties

OFFSETTING Oklahoma's steady decline in drilling, two large gas wells were brought in, one located some 30 miles west of the Hugoton gas area and the other extending the Cement oil and gas pool; and in Hughes County a wildcat was making 10 bbl. of oil an hour. The Cimarron County gas discovery is the first commercial production of oil or gas in the county.

**Cimarron County.**—Pure Oil Co. 1 Cox, SE SW SE 16-5n-8ecm, a wildcat in the Panhandle on which little information has been obtainable, will be completed as a gas well through perforations at 4,670-4,750 ft. It was drilled to 6,280 ft. in granite and plugged back. The flow of gas was estimated at 19,000,000 cu. ft. with a rock pressure of 850 lb. Location is 9 miles west of Sturgis on a block of some 20,000 acres which Pure was reported to have assembled 2 years ago. The Pure Oil Co. also has other large blocks in the area. Noble Drilling Co. had the contract for 8,000 ft., or the granite.

**Hughes County.**—Deep Rock Oil Corp. 1 Price, NE NE NE 29-7n-10e, 6 miles southeast of Holdenville, was flowing at the rate of 5 to 10 bbl. of oil an hour in the Cromwell sand at 3,866-87 ft. The well cleaned itself in 18 minutes with gas estimated at 5,000,000 cu. ft.

**Grady County.**—Ohio Oil Co. 1 G. C. Laflin, SW SW 7-5n-8w, extended the Cement pool a mile east and across the county line. It was completed as a gas well after gaging in excess of 40,000,000 cu. ft. a day. Drilled to 6,500 ft., it was plugged back and perforated in a number of sands from 5,042-5,800 ft.

### OKLAHOMA COMPLETIONS

**Wildcats**

Lincoln County: Texas 1 Wells, SE SW 11-13n-5e, dry, T.D. 4,985 ft., Prue 3,445 ft., Bartlesville 3,985 ft., Hunton 4,706 ft., Viola 4,885 ft., Wilcox 4,931 ft.

Payne County: D. B. Malernee 1 Walker, NE SW NW 30-19n-6e, pumped 10 bbl., Mayes 3,336-3,470 ft., T.D. 3,646 ft., Wilcox 3,530 ft., second Wilcox 3,627 ft., P.B. 3,385 ft., acid 3,336-80 ft., shot 3,462-70 ft.

W. B. Osborn and Superior 1 Maners, NW SW SE 26-18n-6e, dry, T.D. 3,459 ft., Layton 1,770 ft., Prue 2,670 ft., Bartlesville 2,930 ft., Viola 3,407 ft., Wilcox 3,458 ft.

Pottawatomie County: Mid-Continent 1 Aydebotte, SE SE SE 29-10n-3e, dry, T.D. 5,610 ft., Cromwell 4,910 ft., Hunton 5,243 ft., Wilcox 5,501 ft., second Wilcox 5,585 ft.

**Fields**

Burbank, Osage County: Magnolia No. 6, SW NE SW 11-26n-6e, pumped 87 bbl., sand 2,840-96 ft.

Cement, Grady County: Ohio Oil Co. 1 G. C. Laflin, SW SW 7-5n-8w, gaged 40,000,000 cu. ft. gas, R.P. 1,750 lb., sands 5,042-5,120 ft., 5,210-43 ft., 5,365-85 ft., 5,740-5,800 ft., T.D.

Cushing, Creek County: J. E. Crosbie 2 Jones, NW SW 12-18n-7e, flowed 25 bbl., Skinner sand 2,717-47 ft.

Lake Shawnee, Pottamatomie County: Magnolia 1 Heller-Petro, NW SW SE 28-10n-2e, dry, T.D. 5,933 ft., Wilcox 5,925 ft.

Loco, Stephens County: J. E. Jackson 2 Lowery, SW SE NW 8-3s-5w, pumped 50 bbl., sand 1,040-60 ft., T.D. 1,078 ft.

Sylvian, Seminole County: J. E. Hall 1 Tucker, NW NW SW 11-10n-7e, flowed 105 bbl., Cromwell 3,658-72 ft.

**Miscellaneous**

Okmulgee County: Meuller et al 1-A Pine, SW NW SE 28-15n-12e, dry, T.D. 2,762 ft.

Pawnee County: Johnson Oil & Ref. 1 School Land, NE NW SW 16-21n-8e, input well, T.D. 1,741 ft., sand 1,640 ft.

Osage County: Oklahoma Natural Gas No. 2142, SW NW NE 28-20n-12e, input well, T.D. 1,600 ft., sand 1,572 ft.

## SOUTHWEST TEXAS

# Wilcox Discovery in Prospect Near Old Slick Pool

CORPUS CHRISTI, Tex.—Drill-stem tests at Continental Oil Co. 1 A. S. Wood on the southwestern edge of the old nonproductive Slick field, in Goliad County, indicate that the well will turn out to be a Wilcox sand discovery. The hole is now below 7,800 ft., and it is planned to carry it to about 8,000 ft. before casing is cemented for production attempt. On a 20-minute drill-stem test at 7,604-12 ft. the well is reported to have recovered the 1,500-ft. water cushion, 180 ft. of drilling fluid, and 2,160 ft. of 33-gravity oil, with 2½ lb. working pressure, 2,900 lb. bottom-hole pressure, and 3,000-lb. shut-in bottom-hole pressure. The well, in the C.E.P.I.R.R. & Manufacturing Co. Survey, is about 7 miles west of the Transwestern Oil Co. 1 Parr-Sellers, which recently opened the new Porter field in Karnes County. The Slick field, opened by the late Tom Slick in 1930, is no longer classed as productive. There was fairly active leasing in the county during 1940 and 1941, spurred by two trend plays, the Carrizo-Wilcox sand trend, through the northern part, and the Vicksburg sand trend, through the central and southern parts. Major companies took checkerboard blocks through these trends, along with scattered protection acreage.

**Karnes County.**—Transwestern's 1 Parr-Sellers, 6½ miles southeast of Runge, tested gas, with a spray of oil, through ⅛-in. choke, with perforations at 4,122-23 ft. Tubing pressure was 1,400 lb. and casing pressure 1,530 lb. Testing continued. J. W. Mayo et al 1 Moczygemba, wildcat test 2 miles southwest of Falls City, topped the Wilcox at 3,308 ft. Seaboard Oil Co. 2 Fertsch, in the new Hobson field, tested gas, wash water, and a small quantity of oil through perforations at 4,025-29 ft. Following a squeeze job the well blew out. It was killed and resqueezed and was waiting for cement to set.

**Starr County.**—Lockhart & Davenport 1 First National Bank of Mission, 1,320 ft. south of Ike Howeth's 1 Caffarelli, which opened the new Lockart pool, has logged and tested the sand in which the discovery found production and is drilling below 3,650 ft., seeking the Yegua sand, several hundred feet lower. Sun Oil Co. 1 Montalva heirs, 1 mile southwest of the North Sun field, tested no pressure on a 3-hour drill-stem test through ¼-in. choke, with perforations at 5,915-17 ft. Operator squeezed all perforations and was waiting for cement to set. Sun 2-A Alvarado, 5 miles northeast of the Rincon field, was drilling at 4,458 ft. in shale.

**Duval County.**—A 20-minute test of perforations at 2,914-28 ft., with ¼-in. chokes at top and bottom, tested no pressure at Texon Royalty Co. and R. H. Hawn 1 Benevides, 2 miles southeast of the O'Hern field. It recovered 20 ft. of mud, with a trace of oil. Hamill & Smith 1 Dinn, a mile west of the Kohler field, was drilling at 3,085 ft. in a sidetracked hole.

### SOUTH TEXAS COMPLETIONS

**Wildcats**

Jim Hogg County: Humble 3-B Mestena Oil & Gas Co., 15 mi. S of Hebbronville, dry at 5,958 ft.

**Fields**

Aviator, Webb County: George Buck 1 Puig Bros., Albercas grant, 15 bbl. oil and 30 bbl. salt water, pumping, perf. 1,831-35 ft., T.D. 1,919 ft., P.B. 1,838 ft.

*(Continued on Page 123)*

# Pratt County Discovery Is In Arbuckle Lime

PRATT County, which has been leading the state in activity for the past few weeks, got another oil pool in the northwestern corner near the county line. Stanolind Oil & Gas Co. 1 Frisbie, SE SW 5-26-13w, 5½ miles northwest of the West Carmi pool, found the Arbuckle lime dry at 4,455 ft. and plugged back to test the Lansing at 3,891 ft. After a 500 and a 2,000-gal. acid treatment the well flowed, 48, 44 and 46 bbl. on three 1-hour tests. The flow was through 1-in. choke on 2½-in. tubing. Further tests were to be made after another treatment of 4,000 gal. Stanolind, Gulf Oil Corp. and Skelly Oil Co. are major companies holding acreage around the well.

**Stafford County.** — Extension of Viola lime production west of the Zenith pool was made by Plains Exploration Co. 1 Kelly, NE SE 2-24-11w. The well swabbed 101 bbl. of oil a day at a total depth of 3,803 ft. Location is approximately 1 mile west of production in the main field. The Corporation Commission designated the area the West Zenith pool. Falcon-Seaboard and Phillips Petroleum Co. 1 Spangenberg, N½ NE SE 21-22-12w, was completed for a pumping potential of 228 bbl. a day in Arbuckle at 3,691-97 ft. The crude tested 40.5 gravity. The well swabbed about 7 bbl. of oil an hour before acid treatment and then pumped 232 bbl. in 24 hours, cutting about 7 per cent water and sediment. Hannum Drilling Co. was contractor. It is the discovery well of the Spangenberg pool.

**Ellsworth County.**—A new producing horizon for the Stoltenberg pool was found at I. W. Murfin 3 Loula, S½ SW SE 28-16-10w. The well was drilled to 3,010 ft., topped the Lansing at 2,980 ft., showed oil at 2,990-3,000 ft. and flowed 32 bbl. in 4 hours; then was shut in for 20 hours and when opened flowed 22 bbl. of oil in 3 hours, by heads. Main production for the Stoltenberg area is the Arbuckle lime at around 3,335 ft.

### KANSAS COMPLETIONS

#### Wildcats

Harvey County: Branine & Goering 1 McCune, NW SW 1-24-2e, dry, T.D. 3,270 ft., Mississippi lime 2,957 ft., Hunton 3,056 ft., Viola 3,132 ft., Simpson shale 3,155 ft., sand 3,170 ft., Arbuckle 3,233 ft.

Pratt County: Zephyr Drlg. 1 Larabee, SW SW SE 9-29-11w, dry, T.D. 4,700 ft., Lansing 3,778 ft., Viola 4,445 ft., Simpson 4,530 ft., Arbuckle 4,638 ft.

Russell County: Ohio Oil 1 Polcyn, NE NW NE 19-13-15w, dry, T.D. 3,377 ft., Lansing 3,082 ft., Arbuckle 3,359 ft.

Stafford County: Helmerich & Payne 1 Vincent, E½ NE NE 5-24-11w, dry, T.D. 3,887 ft., Viola 3,746 ft., Simpson 3,798 ft., Arbuckle 3,857 ft.

Falcon-Seaboard and Phillips 1 Spangenberg, N½ NE SE 21-22-12w, pumped 228 bbl., Arbuckle 3,691-97 ft., discovery of Spangenberg pool.

#### Fields

Bitikofer, McPherson County: E. B. Shawver 1-A Voth, NW SW NE 1-20-1w, pumped 150 bbl., Mississippian chat 2,893-2,918 ft.

Chase, Rice County: Cities Service 4 Habiger, SW NE 20-19-9w, dry, T.D. 3,295 ft., Arbuckle 3,268 ft.

Alpine Royalty 1-A Coffman, SE NW 31-19-9w, dry, T.D. 3,305 ft., erroded Arbuckle 3,303 ft.

Douglas, South, Butler County: Deep Rock 2 Eckels, NE NE SW 32-29-4e, dry, T.D. 3,085 ft., Arbuckle 3,069 ft.

Drach, Stafford County: Atlantic 1 Teichmann, SW SW 8-22-12w, swabbed 18 bbl. an hr., Arbuckle 3,677-81 ft.

Alpine and Phillips 1 Smith, N½ NE NW 17-22-12w, dry, T.D. 3,790 ft., Arbuckle 3,763 ft.

Ferrell, Butler County: Table Mesa Oil 10 Ferrell Ranch, SW SE NW 21-28-8e, pumped 25 bbl., Mississippi lime 2,735-50 ft.

Greenvale, Russell County: Cities Service 2-B Steinle, S½ NW NW 32-14-12w, pumped 232 bbl., Gorham sand 3,166-69 ft.

Hall-Gurney, Russell County: Magnolia Pet. 4 Trapp, SE SW NE 31-14-12w, pumped 418 bbl., Gorham 3,175-79 ft.

Henne, McPherson County: Adair & Morton 2 Anderson, S½ NW SW 16-17-1w, 3,000 bbl., Mississippian chat 2,623-29 ft.

Iuka, North, Pratt County: Skelly 3-B Knop, SW NE SE 25-26-13w, flowed 310 bbl. in 6 hr., Arbuckle 4,302-26 ft.

Shell 1 Schwertfeger, SW SW SW 30-26-12w, flowed 200 bbl. in 6 hr., Arbuckle 4,292-4,333 ft.

Magnolia 1 Binger, SW NW NW 31-26-12w, flowed 25 bbl. an hr., Arbuckle 4,301-15 ft.

Keesling, Rice County: Bay Pet. 1-A Smith, NW NE 16-20-9w, pumped 408 bbl., Arbuckle 3,242-50 ft.

Keighley, Butler County: Phillips 28 Keighley, NE SE 22-27-7e, dry, T.D. 3,203 ft., Arbuckle 3,189 ft.

Lindsborg, McPherson County: Carter Oil 3 Carlson, SW NW 7-17-3w, pumped 523 bbl., Viola 3,416-27 ft.

M. & L. Oil Co. 4 Gustafson, W½ NW SW 7-17-3w, pumped 462 bbl., Viola 3,435-44 ft.

Auto-Ordnance 8 Bengstrom, W½ NW NE 25-17-4w, pumped 389 bbl., Viola 3,389-96 ft.

Pawnee Rock East, Barton County: Derby Oil 1 Deckart, NW NW NE 18-20-15w, dry, T.D. 3,936 ft., Arbuckle 3,863 ft.

St. John, Stafford County: Atlantic et al 2 Toland, C S½ SW 22-24-13w, pumped 87 bbl., Arbuckle 4,090-98 ft.

Silica, Barton County: Bay Pet. 1 Burmeister, N½ SE NW 25-19-11w, dry, T.D. 3,343 ft., Lansing 3,056 ft.

Wilkens, Ellsworth County: Pryor & Lockhart 2 Schroeder, N½ SE NW 30-17-9w, dry, T.D. 3,283 ft., Arbuckle 3,272 ft.

Witt, Russell County: National Ref. 3 Boxberger, SW SE SW 3-14-14w, pumped 476 bbl., Lansing 2,994-3,004 ft.

### NEBRASKA

ST. JOSEPH, Mo.—J. E. Palensky, of Vermilion, S.D., and Falls City, Neb., has started a wildcat test, 1 Edward White, SE SE SE NE 11-64n-40w, Atchison County, Missouri. This is 1 mile east and 3 north of Fairfax and about 3 miles southwest of the Cities Service discovery well. Palensky was drilling below 500 ft. at the close of the week.

Four miles south of Hiawatha, Kans., a wildcat test has been started by Clifton Gall and Edwin S. Towle of Falls City. It is 1 Amann, SW SW 18-3s-17e, and was drilling below 900 ft.

#### NEBRASKA COMPLETION

Richardson County: Ferguson & Towle 1 Ehbaurer, NW NE NE 2-2n-15e, dry, T.D. 2,520 ft., Hunton 2,407 ft., show oil 2,411-15 ft.

## APPALACHIAN FIELDS

### New Oil Area Opened in Southwest Pennsylvania

PITTSBURGH, Pa. — In Monroe Township, Clarion County, Hill Brothers completed a test on the Louis Maggy farm in the Clarion sand which is showing for 25 bbl. a day at 946 ft. with a total depth of 949 ft. This is the first showing of oil in the vicinity, the nearest being at Reigle School about 4 miles to the southwest. It is about 3,000 ft. southeast of Churchville. There are several gas wells in the vicinity, all of which passed through this formation.

On Laurel Ridge in Ligonier Township, Westmoreland County, New Penn Development Co., William E. Snee et al reached 7,923 ft. in the test on the John and Eleanor Beck farm and are drilling on something solid presumed to be the Onondaga but not tested as such.

#### SOUTHWEST PENNSYLVANIA COMPLETIONS

Armstrong County, Bethel Township: T. W. Phillips Gas & Oil Co. 2 Frank Darbaker, dry, through Bradford sand, T.D. 2,914 ft.

Kittanning Township: Equitable Gas Co. 2 L. Egley, 38,000 cu. ft. gas, Hundred-foot sand 1,374-1,445 ft., gas 1,428 ft., Tiona sand 2,857-2,900 ft., gas 2,878 and 2,885 ft., T.D. 2,920 ft.

Plum Creek Township: Bashford et al 1 Elex Clark, 28,000 cu. ft. gas, Big Injun sand 1,100-80 ft., gas 1,152 ft., Thirty-foot sand 1,452-1,519 ft., gas 1,473 ft., T.D. 3,420 ft.

Apollo Gas Co. 1 C. G. Rosborough, 112,000 cu. ft. gas, Murraysville, Hundred-foot, Thirty-foot and Tiona sands, T.D. 3,084 ft.

Wayne Township: Humphries, Stone & McCall 1 Peter Kammerdeiner, 100,000 cu. ft. gas, Murraysville 1,087-1,182 ft., gas 1,134 ft., Hundred-foot 1,193-1,302 ft., gas 1,239 ft., Tiona 2,682-2,725 ft., gas 2,683-2,708 ft., T.D. 3,465 ft.

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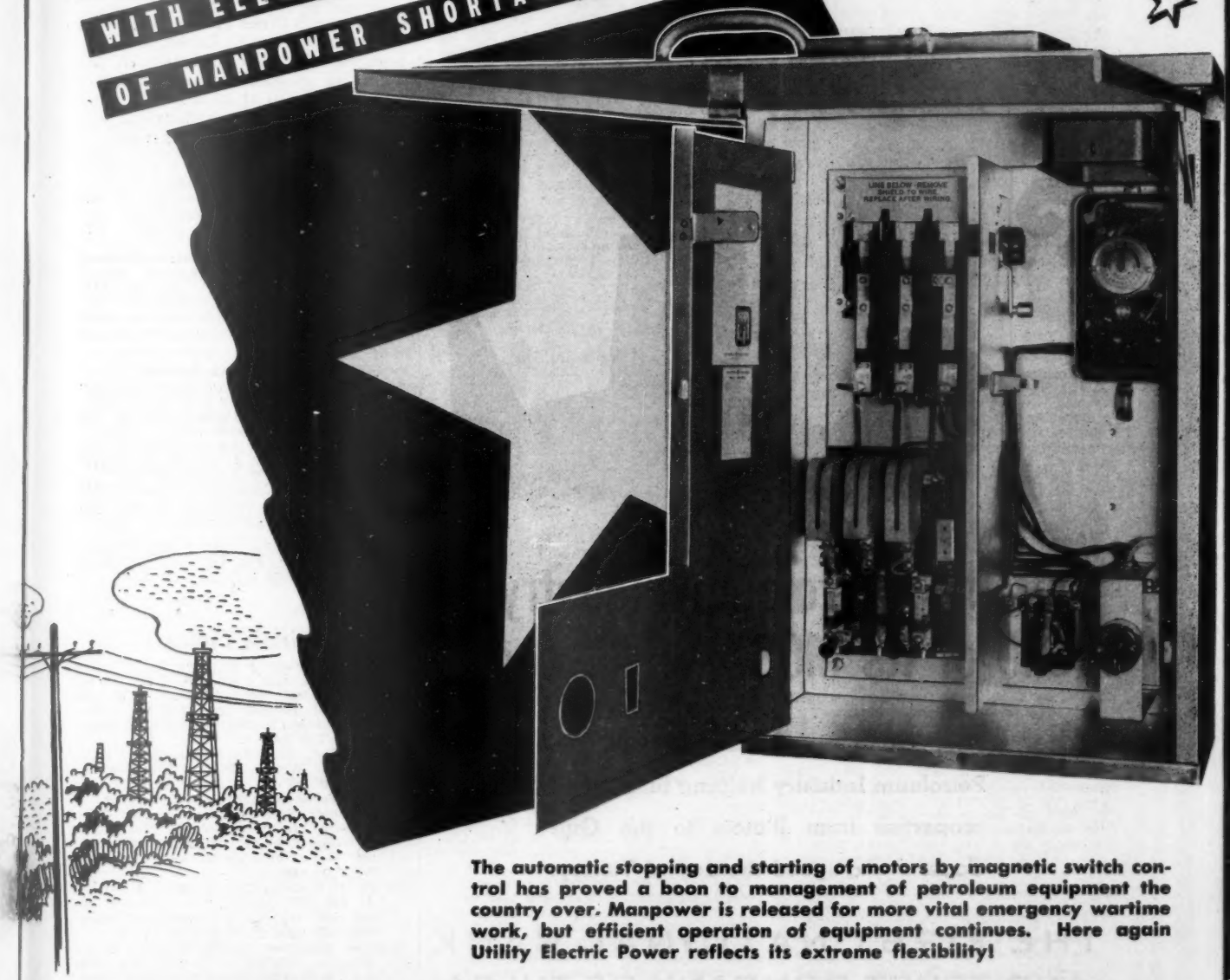

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Clarion County, Monroe Township: Hill Bros. 1 Louis Maggy, 25 bbl., Clarion sand 946 ft., T.D. 949 ft.

Fayette County, German Township: Peoples Natural Gas Co. 1 Wm. Parshall, dry, Bayard sand 2,755-86 ft., T.D. 3,551 ft.

Greene County, Cumberland Township: Greensboro Gas Co. 2 Lizzie Craig, 9 bbl., Big Dunkard sand 1,065 ft., oil 1,075 ft., T.D. 1,126 ft.

Monongahela Township: Ira Donley et al 1 George C. Genacy, dry, T.D. 2,830 ft.

Indiana County, Young Township: Peoples Natural Gas Co. 1 H. E. Smith, 48,000 cu. ft. gas, Bradford sand 3,452-3,500 ft., gas 3,454 ft., T.D. 4,011 ft.

Washington County, North Strabane Township: Keystone Gas Co. 1 W. W. Weygandt, dry, through Fifth sand, T.D. 2,965 ft.

Westmoreland County, Bell Township: Peoples Natural Gas Co. 2 C. B. Carnahan, drilled deeper, from 1,555 ft., 950,000 cu. ft. gas, Hundred-foot sand 1,626 ft., gas 1,628 ft., T.D. 1,628 ft.

### WEST VIRGINIA

In Brown's Creek district, McDowell County, Godfrey L. Cabot, Inc., has reached 6,454 ft. in the test on the John Gilbert lease with the Corniferous lime topped at 6,230 ft., Oriskany 6,322-34 ft. and no gas showing.

#### WEST VIRGINIA COMPLETIONS

Calhoun County, Sherman district: South Penn Natural Gas Co. 15 J. S. Sharp, 2 bbl., Injun sand, T.D. 2,021 ft.

Doddridge County, West Union district: Edmond Tate 1 J. E. McConnell heirs, 105,000 cu. ft. gas, Big Injun sand, T.D. 1,845 ft.

Lincoln County, Duval district: South Penn Natural Gas Co. 4 Jonas V. Alvord, drilled deeper from Big lime gas 1,754 ft., 2½ bbl., Berea, T.D. 2,230 ft.

Raleigh County: Columbian Carbon 1 Rowland Land Co., Oriskany 6,014-27 ft., dry at 6,703 ft.

#### ORISKANY GAS FIELDS

Jackson County, Ravenswood district: United Fuel Gas Co. 5149 C. F. Blair, 1,831,000 cu. ft. gas, Oriskany 4,916 ft., gas 4,919-24 ft., shot, 4,982 ft.

Columbian Carbon Co. et al 692 C. W. Tolley, 158,000 cu. ft. gas, Oriskany 5,006 ft., shot, R.P. 350 lb., T.D. 5,097 ft.

Ripley district: Columbian Carbon Co. 687 C. F. Bayer, 1,154,000 cu. ft. gas, Big Injun sand, gas 1,946-50 ft., R.P. 680 lb., T.D. 1,950 ft.

West Virginia Gas Corp. 1 Ray Painter, 103,000 cu. ft. gas, Oriskany 5,091-5,133 ft., gas 5,097-98 ft., T.D. 5,148 ft.

## Illinois Fields

*(Continued from Page 116)*

bbl., Biehl sand, 1,347-49 ft., T.D. 1,387 ft.

South Lawrence, Wabash County: Wright Oil 2 M. Hershey, NW NE NE 34-2n-12w, pumped 50 bbl., Benoist sand 2,004-08 ft., T.D. 2,013 ft.

South Mason, Effingham County: K. Benson 2 R. Wright, SE NW SW 27-6n-5e, pumped 125 bbl., Benoist top 2,275 ft., Aux Vases top 2,339 ft., T.D. 2,355 ft.

South Sailor Springs, Clay County: McBride 2 Armstrong, SE NW NW 10-3n-7e, pumped 16 bbl. oil and 2½ bbl water, Weiler or Cypress sand top 2,598 ft., T.D. 2,625 ft.

St. Jacob, Madison County: Shell 2 Fairies A, SW NE NE 34-3n-6w, pumped 45 bbl. oil and 525 bbl. water. Trenton lime top 2,298 ft., T.D. 2,325 ft.

Walpole, Hamilton County: Texas 1 B. F. Johnston, NW SE SW 26-6s-6e, dry 3,100 ft., Tar Springs 2,390 ft., upper Glen Dean 2,460 ft., lower Glen Dean 2,493 ft., Golconda 2,610 ft., no Barlow lime, Cypress 2,726 ft., Weiler 2,794 ft., upper Renault 3,010 ft., lower Renault 3,054 ft., Aux Vases top 3,061 ft., sand 3,069-94 ft.

## CALIFORNIA

# Jacalitos Pool in Fresno County Is Extended By Small Well

LOS ANGELES, Calif.—Standard Oil Co. appears to have extended the southern limits of production in the Jacalitos field of Fresno County although the well in question, No. 61-35 in 35-21s-15e, is having considerable trouble with a fine sand that builds up in the hole after the well has been on production for a few hours. Standard's field department has put this well on the beam twice only to have it sand up after pumping about 12 hours. This production is coming from the Temblor of Miocene age which Wilshire-Annex Oil Co. proved productive at Jacalitos about a year ago. The latter has completed six wells in Sections 26 and 27 located immediately north of Standard's leases in Section 35. The productive interval in the Temblor is quite thin at Jacalitos but on the basis of one well to 40 acres should prove commercially profitable due to low drilling costs which reflect fast drilling, small amount of casing required and the comparatively shallow depth at which the pay is reached. Standard's new well was drilled to 4,415 ft. and appears good for about 25 bbl. of clean 40.7-gravity oil daily. These shallow wells can be drilled from spud to completion in about 2 weeks as the subsurface formations are conducive to fast footage.

**SAN JOAQUIN VALLEY COMPLETIONS**

Belridge, South, Kern County: Belridge Oil Co. 56-34-A fee, 34-28s-21e, pumped 70 bbl. net, 14.4°, 20 per cent cut, T.D. 785 ft., perf. 518-785 ft., in South Belridge zone of Pleistocene age.

Belridge 57-34 fee, 34-28s-21e, pumped 70 bbl. net, 13.5°, 22 per cent cut, T.D. 750 ft., perf. 505-750 ft., in South Belridge zone.

Belridge 66-34-A fee, 34-28s-21e, pumped 75 bbl., 13.5°, 10 per cent cut, T.D. 785 ft., perf. 506-785 ft., in South Belridge zone.

General Petroleum Corp. 10-12 Belridge, 12-29s-21e, pumped 48 bbl. net, 14.9°, 20 per cent cut, T.D. 1,030 ft., perf. 884-1,029 ft., in South Belridge zone.

General Petroleum 73-2 Belridge, 2-29s-21e, pumped 50 bbl., 17.1°, 5 per cent cut, T.D. 1,034 ft., perf. 552-634 ft., 674-714 ft., 764-1,034 ft., in South Belridge zone.

Texas Co. 4 Wrightson fee, 12-29s-21e, pumped 11 bbl. net, 13.8°, 70 per cent cut, T.D. 1,170 ft., perf. 973-1,004 ft., 1,044-1,105 ft., 1,146-60 ft., in South Belridge zone.

Buena Vista Hills, Kern County: Standard Oil Co. 39-11-D, 11-32s-24e, pumped 50 bbl., 21.1°, 10 per cent cut, T.D. 2,916 ft., perf. 2,780-2,915 ft., Buena Vista zone of Pliocene age.

Coalinga, East, Fresno County: Shell 147-29 fee, 29-19s-15e, pumped 84 bbl., 18.9°, 0.4 per cent cut, T.D. 2,300 ft., P.B. 2,180 ft., perf. 2,079-2,139 ft., 2,161-79 ft., black shale 1,933 ft., Kreyenhagen 2,296 ft., in East Coalinga zone of Pliocene age.

Shell 124-34 fee, 34-19s-15e, pumped 52 bbl., 19.5°, 70 per cent cut, T.D. 2,717 ft., perf. 2,260-2,716 ft., in East Coalinga zone.

Standard 17-35-A fee, 35-19s-15e, pumped 8 bbl., 20.8°, 2 per cent cut, T.D. 3,115 ft., 60 mesh perf. 2,961-3,113 ft., in East Coalinga zone.

Coalinga, West, Fresno County: Texas 8-C, 6-20s-15e, pumped 21 bbl., 21.1°, 4.2 per cent cut, T.D. 2,450 ft., P.B. 2,405 ft., perf. 2,373-2,404 ft., in East Coalinga zone of Pliocene age.

Elk Hills, Kern County: U. S. Navy 25-1-G, 1-31s-24e, pumped 449 bbl., net 17.7°, 10.9 per cent cut, T.D. 3,247 ft., perf. 3,188-3,243 ft., completed in Tupman zone of Pliocene age.

U. S. Navy 45-27-S, 27-30s-24e, pumped 352 bbl., 17.5°, 0.1 per cent cut, T.D. 3,551 ft., perf. 3,486-3,501 ft., in Tupman zone.

U. S. Navy 41-34-S, 34-30s-24e, pumped 336 bbl., 20.2°, 2.3 per cent cut, T.D. 3,442 ft., P.B. 3,246 ft., perf. 3,030-3,243 ft., in Tupman zone.

Jacalitos, Fresno County: Standard 61-35 Jacalitos, 35-21s-15e, pumped 21 bbl., 40.3°, 0.1 per cent cut, T.D. 4,415 ft., perf. 4,382-4,413 ft., in Temblor of Miocene age.

Kern Front, Kern County: General Petroleum 3 Wetmore, 14-28s-27e, pumped 61 bbl. net, 14.1°, 34 per cent cut, T.D. 1,971 ft., perf. 1,759-1,927 ft., in Kern Front zone of Pliocene age.

Standard 11-9 fee, 9-28s-27e, pumped 117 bbl. net, 12.6°, 9 per cent cut, T.D. 2,810 ft., perf. 2,539-2,809 ft., in Kern Front zone.

Westates Petroleum Corp. 42 Cauley, 16-28s-27e, pumped 166 bbl. net, 14.8°, 10 per cent cut, T.D. 2,965 ft., perf. 2,893-2,965 ft., M point 2,582 ft., N point 2,716 ft., P point 2,723 ft., Q point 2,778 ft., R point 2,850 ft., S point 2,930 ft., in Kern Front zone.

Lost Hills, Kern County: Universal Consolidated Oil Corp. 50 fee, 32-26s-21e, pumped 5 bbl. net, 20.8°, 24 per cent cut, T.D. 1,771 ft., perf. 1,226-1,765 ft., in Los Hills zone of Pliocene age.

McKittrick, Kern County: Honolulu Oil Corp. 52 Fitzgerald Cymric, 26-29s-21e, pumped 100 bbl. net, 12.4°, 30 per cent cut, T.D. 1,297 ft., perf. 1,058-1,237 ft., in Cymric zone of Pliocene age.

Midway-Sunset, Kern County: Chanslor-Canfield Midway Oil Co., 53-9 fee, 9-32s-23e, pumped 30 bbl. net, 15.9°, 20 per cent cut, T.D. 1,861 ft., perf. 1,165-95 ft., 1,205-15 ft., 1,265-80 ft., 1,405-10 ft., 1,440-50 ft., 1,465-85 ft., 1,650-1,705 ft., in Midway zone of Pliocene age.

Texas 19 Midway-Sunset pool, 36-31s-22e, pumped 12 bbl., 16.4°, 1 per cent cut, T.D. 1,998 ft., P.B. 1,941 ft., perf. 1,666-1,934 ft., in Midway zone.

Mount Poso, Kern County: Ring Oil Co. 20-29 Bowles, 29-26s-28e, pumped 106 bbl., 15.4°, 1 per cent cut, T.D. 1,781 ft., perf. 1,756-81 ft., in Vedder zone of Miocene age.

Mount Poso wildcat district, Kern County: Jergins Oil Co. 1 Lambert Lands, 35-26s-27e, abandoned in gray sand, T.D. 3,340 ft., Vedder zone, 3,015 ft.

Rio Vista gas field, Solano County: Standard 1 Andrus Island unit, 3-3n-3e, flowed 11,967,000 cu. ft. dry gas, no oil, 40/64-in. bean, pressures 1,447/1,405 lb., T.D. 3,904 ft., perf. 3,810-3,902 ft., in Emigh gas zone of Eocene age.

Round Mountain, Kern County: Honolulu 24 Round Mountain, 20-28s-29e, pumped 70 bbl. net, 17.1°, 83 per cent cut, T.D. 1,820, perf. 1,774-1,818 ft., Vedder zone.

Shell 5 Olcese Lilly, 21-28s-29e, abandoned in gray sand, T.D. 1,968 ft.

### Small Well Reopens Newport District

D. W. Elliott has rejuvenated interest in the Newport district southeast of the Huntington Beach field by completing his 1 Townsend Land Co. pumping 25 bbl. of 13-gravity oil per day from 2,366 ft. Drilling and production activities have not been especially successful and it remains to be seen, therefore, whether Elliott's new well is able to maintain a sustained production over a period of time. Initial work in this field dates back a number of years and at one time there were several shallow wells that produced a small amount of oil intermittently. Low prices for heavy oil, during the long period of flush production in high-gravity fields in Los Angeles Basin rendered production of heavy oil uneconomical. Most of the earlier wells in this area were comparatively shallow completions whereas Elliott's new well is bottomed at 2,366 ft. with 62 ft. of formation open to production. Several deep tests have been drilled in the Newport area but none were located close enough to Elliott's new well to have any effect on this accumulation. The productive formation is believed to be of Miocene age and in view of the past life of this field operators are quite sanguine to accept this as a new productive region.

**LOS ANGELES BASIN COMPLETIONS**

Brea Olinda, Orange County: Union 76 Stearns, 7-3s-1w, pumped 616 bbl., 24.4°, 5 per cent cut, 288,000 cu. ft. gas, T.D. 4,418 ft., P.B. 3,860 ft., perf. 3,551-3,858 ft., in Olinda zone of Pliocene age.

Huntington Beach, Orange County: John H. Marion 1 Quadara, 35-5s-11w, pumped 95 bbl., 19.1°, 8 per cent cut, T.D. 4,125 ft., perf. 4,075-4,120 ft., in upper Ashton zone of Pliocene age.

McVicar, Rood & McCallen 1 fee, 2-6s-11w, pumped 30 bbl., 18.5°, 15 per cent cut, T.D. 3,692 ft., perf. 3,613-58 ft., in upper Ashton zone.

Westport Oil Co. 9 W.P., 36-5s-11w, pumped 42 bbl., 19.2°, 2.2 per cent cut, T.D. 4,000 ft., perf. 3,947-87 ft., in upper Ashton zone.

Newport, Orange County: D. W. Elliott 1 Townsend Land, 20-6s-10w, pumped 25 bbl., 13.1°, 3 per cent cut, T.D. 2,366 ft., perf. 2,306-66 ft., in Newport zone of probable Miocene age.

Salt Lake, Los Angeles County: Shell 1 Verne Community, 21-1s-14w, abandoned in sandstone showing 70° to 90° dips, T.D. 7,924 ft., formation at 2,000 ft. showed 16° dips, at 3,000 ft. showed 25° dips, no oil showings below 3,600 ft., bottomed in middle Miocene.

### COASTAL DISTRICT

**Ventura County.**—Standard Oil Co. has started derrick construction for 1 Crestmont, which will be drilled on Ramona anticline in Ventura County southeast of Continental's 2 Holser which is making hole at 6,800 ft. The

*(Continued on Page 135)*

# Three Dikes, 25,000 Ft. Long, Will Isolate Cumberland Field

DENISON, Tex.—Three dikes and two cuts, involving the handling of 8,000,000 cu yd. of earth at a cost of approximately $5,000,000, will detour the Washita River in southern Oklahoma to save the Cumberland oil field from inundation by waters of the $50,000,000 Denison Dam, district Army engineers disclosed here this week end.

Work is scheduled to begin in the next few days by a corps of contractors who will blitz the project to completion at the earliest possible date as Red River will be closed at the Denison Dam in June and waters will begin rising in the lower areas adjacent to the oil field.

It has been known for some time that government engineers were planning to save the field from inundation, but not until recently were details disclosed by the engineers.

The three dikes will have a combined length of 25,000 ft., and the two cuts will be 9,000 ft. long. The project is scheduled to be 80 per cent complete by next November 15.

The largest dike will be located on the northern edge of the field. It will start in Johnston County and extend in a curved fashion down into Bryan County. Its total length will be 14,000 ft.

Just east of the center of the dike will be a cut 3,000 ft. long and it will form a new channel for the Washita River. Approximately 1,000,000 cu. yd. of earth must be excavated for the cut. Peak elevation in this cut is 630 ft. and it must be reduced to 600 ft. The engineers explained that the peak elevation did not extend throughout the 3,000-ft. length of the cut. The cut begins in 16-5s-7e, of Johnston County and ends in 21-5s-7e of Bryan County.

Just below the cut and across Rock Creek will be a 4,000-ft. dike which will hold Rock Creek from the production area and reroute it into the new channel of the Washita River.

### Second Cut

At the southeast corner of the field will be another cut 6,200 ft. long, involving an excavation of approximately 4,000,000 cu. yd. of earth. Peak elevation in this cut will be 690 ft., and it will be cut to 610 ft. The engineers also explained that the peak elevation did not extend throughout the cut.

The fifth phase of the project is the lower dike, extending east and west across the stream at the south end of the field. This dike will be 6,400 ft. long.

Approximately 4,000,000 cu. yd. of fill will be necessary in the dikes and almost 8,800,000 cu. yd. of excavation will be necessary for the cuts. The engineers said the dikes would be of rolled-fill construction, the same method in constructing the main embankment of the Denison Dam, to insure permanence.

Under original plans of the Denison Dam, the area of the Cumberland field was to have been inundated by 35 ft. of water. Work had been under way on the dam almost a year when Pure Oil Co. 1 Little-100 came in for a potential of 4,520 bbl. daily.

Protection for the field ends a long conflict between Oklahoma authorities and the engineers and leaves the field unmolested for development. Entry to the field will be from Madill after the dikes and cuts have been completed.


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## NORTH LOUISIANA, ARKANSAS

# Artesian Discovery May Be One-Well Pool

SHREVEPORT, La.—The new Artesian field in Calhoun County, Arkansas, was off to a bad start with two offset wells dry. The discovery, Placid Oil Co.'s 4 Freeman-Smith in NE NW 2-15s-14w had pay sand at 2,525 ft. but the same company's northwest offset, the 2 Southern Kraft, was dry at 2,564 ft. and the 7 Freeman-Smith, an east offset was dry at 2,566 ft. Placid Oil Co. was seeking deeper pay at its 5 and 6 Freeman-Smith tests, a mile south of Artesian in Section 11, both wells drilling below 4,600 ft

In Bossier Parish, Louisiana, two outpost wells to the North Carterville pool were nearing the pay zone. White & Hinton 1 Louisiana Land Co. in 16-23n-12w was drilling shale and lime at 5,118 ft. and the H. I. Morgan 1 Bolinger in 38-23n-11w, was drilling in shale and sand at 4,210 ft.

### NORTH LOUISIANA COMPLETIONS

De Soto Parish: Crosby Drlg. I Anders, SW NE 5-11n-14w, dry, T.D. 6,327 ft., Annona 1,520 ft., Tokio 1,974 ft., Paluxy 2,710 ft., porosity 4,975-5,007 ft.

West Carroll Parish: Continental Oil 1 Bruce Lumber Co., SW SW SW 6-20n-9e, dry, T.D. 2,686 ft.

Franklin Parish: C. H. Murphy 1 D. Robinson, SW NW 21-13n-7e, dry, T.D 4,014 ft., Sparta 1,000 ft., Cane River 1,760 ft., Wilcox 2,100 ft., Midway 3,932 ft.

**Fields**

Athens, Claiborne Parish: Skelly and Sunray 1 Wallace-Griffis, SE NE 36-20n-7w, completed as gas well, 17,000,000 cu. ft. open flow, 2,474 lb. R.P., perf. 6,390-6,400 ft., flowed 20 bbl. distillate in 16 hr. through choke, T.D. 6,605 ft.

Calvin, Winn Parish: H. L. Hunt F-26 Goodpine, NE SE 18-12n-4w, dry, T.D. 7,310 ft.

Haynesville, Claiborne Parish: Midstates and Skelly 1 Waller-Sherman, approx. NE NE 2-23n-8w, flowed 350 bbl. in 11½ hr., Pettit 5,399-5,415 ft., T.D. 5,432 ft.

Midstates and Ohio 1 H. R. Smith, NE SW 17-23n-8w, pumped 138 bbl. in 12½ hr., Pettit 5,404-9, 5,453-64 ft., T.D. 5,467 ft.

Monroe Gas, Morehouse Parish: Union Producing Co. 64 Crossett Lumber, C 11-21n-4e, estimated 2,000,000 cu. ft. open flow, 860 lb., R.P., T.D. 2,200 ft.

Nebo, La Salle Parish: Harry Shulman et al 4 Shapiro, 39-7n-3e, flowed 225 bbl. through choke, perf. 3,955-65 ft., T.D. 4,240 ft.

### ARKANSAS COMPLETIONS

**Wildcats**

Calhoun County: Placid Oil 2 Southern Kraft, SW SW 35-14s-14w, dry, T.D. 2,564 ft.

Placid Oil 5 Freeman-Smith, NW SE 14-16s-13w, dry, T.D. 5,082 ft., D.S.T. 3,560-68 ft., recovered 2,400 ft. water.

Columbia County: Southwood Oil 1 R. Staggs, NW SW 10-16s-20w, dry, T.D. 6,935 ft., Saratoga 1,920 ft., Tokio 2,620 ft., James 3,470 ft., Cotton Valley 4,950 ft., Buckner 6,586 ft.

**Fields**

Haynesville, Columbia County: Midstates Oil 1 Beene-Beckett, SE SW 11-20s-20w, flowed 72 bbl. in 4 hr., Pettit 4,315-33 ft., acidized 5,000 gal., T.D. 5,492 ft.

Stephens, Ouachita County: G. H. Vaughn 1 L. Johnson, NE SW 7-15s-19w, pumped 48 bbl., perf. 3,504-18 ft., T.D. 4,145 ft.

G. H. Vaughn 1 W. L. Smart, NW NW 14-15s-20w, pumped 154 bbl., perf. 2,526-34 ft., T.D. 3,476 ft.

R. H. Crow 1-F J. W. Smart, SW NW SW 12-15s-20w, pumped 15 bbl., perf. 3,354-64 ft., 3,367-84 ft., 3,390-3,400 ft., T.D. 3,887 ft.

R. H. Crow 1-B John Hall, SW SW NW 11-15s-20w, pumped 100 bbl., perf. 2,428-32 ft., T.D. 2,641 ft.

R. H. Crow 1 W. T. Guttry, SW NW NE 11-15s-20w, pumped 200 bbl., perf. 2,476-86 ft., T.D. 2,638 ft.

### MISSISSIPPI

JACKSON, Miss. — Plains Production Co. has obtained a permit to drill a test well in 14-5n-2w, between Jackson and Raymond, in Hinds County. H. M. Morse, state oil and gas supervisor, said other tests are projected by at least one major oil company. Pure Oil Co. 1 J. M. McDowell, 6 miles southwest of Natchez, in Adams County, was milling on window to sidetrack at 10,160 ft. Humble Oil & Refining Co. 1-B L. N. Dantzler Lumber Co., 20-5s-8w, Jackson County, was drilling at 9,924 ft. in the Lower Cretaceous. California Co. 1 G. T. Smith, 4-7n-7e, in Lincoln County, plugged back to 11,730 ft. from a total depth of 12,229 ft., made a drill-stem test through perforations at 11,688-11,700 ft. and recovered 21 stands of mud, gas-cut. Another drill-stem test failed. Preparations were begun to test at a lower zone. Richard W. Norton, Jr., 3 L. N. Dantzler Lumber Co., 10-4s-10w, has shut down temporarily at a total depth of 8,352 ft. in shale. The marine Tuscaloosa was topped at 7,462 ft. and the Massive sand at 8,327 ft. Side-wall cores yielded no shows.

### MISSISSIPPI COMPLETION

Copiah County: Carter Oil Co. 1 S. C. Caldwell, SE SE 16-11n-5e, dry, T.D. 10,502 ft.

## Southwest Texas

*(Continued from Page 117)*

Colorado, Jim Higg County: Sun 19 N. S. Thaxton, Sur. 630, A-310, on 12-hr. potential test flowed 35 bbl. through ⅞-in. choke, T.P. 100 lb., S.I. C.P. 725 lb., gas-oil ratio 100, T.D. 3,119 ft.

Driscoll, Duval County: Continental 16-B Clara Driscoll, B.S.&F. Sur., A-138, dry at 2,684 ft.

Glen, Webb County: O. W. Killam 1 Yeager-Stroman, Las Animas grant, A-296, dry at 3,313 ft.

Rincon, Starr County: Continental and W. R. Davis, Inc., 3-B M. M. Garcia, W. D. Stephenson Sur. 907, A-844, 114 bbl. through ⅞-in. choke, T.P. 220 lb., S.I. C.P. 900 lb., gas-oil ratio 359, perf. 3,912-24 ft., T.D. 3,955, P.B. 3,948 ft.

### LOWER GULF COAST COMPLETIONS

**Wildcats**

San Patricio County: Kilgore Developers 1 Thomas Dix, 5 mi. NE Mathis, dry at 5,650 ft.

**Fields**

Odem, San Patricio County: Seaboard 8-C J. F. Welder, J. de la Garza Sur., A-8, 113 bbl. through ½-in. choke, T.P. 750 lb., C.P. 1,700 lb., gas-oil ratio 425, perf. 5,420-25 ft., T.D. 6,753 ft.

Seeligson, Kleberg County: Humble 16 King ranch-Cabeza, L. Bazan Sur. 18, 95 bbl. through ½-in. choke, T.P. 725 lb., gas-oil ratio 526, perf. 5,224-34 ft., T.D. 5,955 ft., P.B. 5,935 ft.

Seeligson, Jim Wells County: Sun 12 J. W. Miller, Nancy Russell Sur. 366, 144 bbl. through 7/64-in. choke, T.P. 1,100 lb., C.P. 1,300 lb., gas-oil ratio 878, perf. 5,916-19 ft., T.D. 5,932 ft.

## Canadian Fields

*(Continued from Page 114)*

**Gaspe.**—In the Gaspe Peninsula of Quebec, C.P.L. 1, Galt Brook dome, has spudded with 20-in. hole, and is in hard limestone below 26 ft. Cable tools are being used. In excavating for the derrick, small quantities of free petroleum were encountered in the bed rock. Work is being started on C.P.L. 2, which will be located approximately 4 miles west of No. 1.

**Ontario.**—In Zone Township, Kent County, Ontario, Union Gas 2 Zone, Lot 11, Concession 4, finished a dry hole at 1,651 ft. Location was approximately 1,500 ft. east of No. 1 discovery well, which developed 974,500 cu. ft. daily in the same horizon. Additional tests will likely be drilled.

In the Haldimand-Norfolk area, Dominion Natural Gas Co., Lot 29, Concession 4, South Cayuga Township, finished at 850 ft. with 145,000 ft. of gas daily. Of five other tests, three were small gassers and two dry holes.

## Stanolind Buys Additional Wells in East Texas

CORSICANA, Tex.—Stanolind Oil & Gas Co. last week purchased, at an estimated price of $5,500,000, a total of 80 producers in the East Texas field from Stroube & Stroube and Wheelock & Collins, of Corsicana. The former owned a portion of the wells outright, and the remainder in partnership with Wheelock & Collins.

Stanolind also confirmed the purchase at an estimated price of $140,000, of two wells on a 3-acre lease from General American Oil Co., of Dallas, Tex., in the C. H. Alexander Survey, in the Lathrop district of the East Texas field. The company also announced purchase of four wells from J. H. Humphries, D. A. Skipper lease, also in the East Texas field.

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# Among the Drilling Contractors

**F. P. Lanahan,** Salina, Kans., has the contract to drill two wells for Nebraska Producing & Refining Co. on their Bohrer lease, NW 10-1n-14e, Richardson County, Nebraska.

**T. J. Conway,** Kilgore, Tex., has moved in and spudded Mae Belcher et al 1 Beulah Workman, Woodbine sand wildcat 4½ miles southwest of Kaufman, in Kaufman County, Texas. Mr. Conway recently finished a Paluxy sand pool opener for Stanolind Oil & Gas Co. at its 1 Tilson heirs, northwest of Campbell, in Hunt County, Texas.

**Tom Hunter,** Wichita Falls, Tex., has started a wildcat for Frank Buttram in Archer County, Texas, in Section 104, A.T.N.C.L. subdivision, in land owned by John F. O'Donohoe.

**Manning & Brown, Inc.,** Denver, Colo., have the contract to drill Continental 1 Bi-clah-bi-to unit, NE SW NW 13-3n-21w, San Juan County, New Mexico. This is a joint test with Stanolind Oil & Gas Co. and Standard Oil Co. of Texas on a block in the Navajo Indian Reservation. It will be drilled to the Pennsylvanian at about 4,500 ft.

**Stony Martin,** Denver, Colo., is to drill a Pennsylvanian test for Argo Oil Co. on the Zuni structure at NE NE 22-15n-29e, Apache County, Arizona.

**Cron & Gracey Drilling Corp.,** Houston, Tex., has the contract to drill 8 R. E. K., in the Gibson field, near Houma, Terrebonne Parish, Louisiana. for Shell Oil Co., Inc. Production in that area is at around 9,000 ft.

**Arrow Drilling Co.,** Tulsa, finaled two tests in Pecos County, Texas, last week. One was for its own account, 1 University, on east edge of Taylor-Link pool, which was dry, and the other was for Bryce McCandless, on University land in Section 20, Block

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*Crew on reverse circulator used for reconditioning wells in the Hull-Silk pool, Archer County, Texas. The rig is one belonging to Grady T. Chupp, Nacona, Tex. Left to right the men are: Leonard Bertram, tool pusher; Travis Fore, driller; J. M. Kirk, Lee C. Cardwell and J. P. Meskins*

26, University Survey, which went to granite at 5,513 ft. and was plugged at that depth.

**Coastal Drilling Co.**, Houston, Tex., was coring at 5,400 ft. at 1 W. W. McCrory, which it is drilling for its own account in the West Mauritz field, Jackson County, Texas.

**Gilger Drilling Co.**, Houston, Tex., is moving on two outpost wells to be drilled for Grubb & Hawkins and Gilger in the Kildare area of Cass County, Texas. One is 1 Davis-King and the other is 1 K. Willard Brown. Gilger is at 2,000 ft. on 1 Edgewood Land & Logging Co., which it is drilling for E. R. Brann in the Perkins area of Calcasieu Parish, Louisiana.

**Houston Drilling Corp.**, Houston, Tex., is below 5,600 ft. on 1 Mauritz, 1½ miles north of the North Laward field, in Jackson County, Texas, which it is drilling for Salt Dome Oil Corp. It has finished 1 Peters as a producer for the same company, in the Mayo field, Jackson County.

**Morris-Hamilton Drilling Co.**, Houston, Tex., has set surface pipe for 1 Beaumont, being drilled for Phillips Petroleum Co. in the new Bear field of Beauregard Parish, Louisiana. It is an offset to General Crude Oil Co. 1 Baldwin, the pool opener. This contractor was completing Union Oil Co. of California 8-G Gray, in the Vinton field, Calcasieu Parish.

**W. A. Richardson Drilling Co.**, Corpus Christi, Tex., has staked location for 1 Tally, 2 miles south of Robstown, in Nueces County, Texas, a wildcat test which it will drill for its own account.

**Housh & Thompson Drilling Co.**, Houston, Tex., set surface pipe at 1,509 ft. last week for 1 Weiss-Hudson, 5 miles east of Hull, in Hardin County, Texas, which it will drill for Northern Ordnance, Inc. Projected depth for this wildcat is 8,000 ft.

**John Harris Drilling Co.**, Wichita, Falls, Tex., will drill a Caddo lime test for Anderson-Prichard Oil Corp.

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and Darby Petroleum Co. on J. C. McCorn land in Robert Hewitt Survey of southwestern Young County, Texas.

**Baldrige & King**, McAllen, Tex., will drill for their own account in the San Juan de Carrictos grant, 3½ miles southeast of the Willamar field, Willacy County, Texas, an 8,500-ft. wildcat test, 1 J. C. Cavazos. There has been much geophysical work in this area since the Willamar pool was opened 3 years ago. This contracting firm has finished its 1 Edgerton, wildcat test 12 miles northeast of Rio Grande City, Starr County, as a pumping well, and has staked location for another test, 2 Francisco Rodriguez estate, 660 ft. south of the Edgerton.

**Davidson Drilling Co.**, Fort Worth, Tex., finished two wells in Ward County, Texas, last week for Stanolind Oil & Gas Co., one in the Byrd and one in the Spencer pools, and are drilling below 6,600 ft. on a 7,400-ft. contract for Skelly Oil Co.'s wildcat east of the Emma pool in Andrews County, Texas. The company also has a rig running in the South Lovington field of Lea County, New Mexico.

**Olson Drilling Co.**, Tulsa, will be the drilling contractor on Carter Oil Co. 1 Cottingham, location for which has been staked in C SE SW 4-7n-3w, in the Washington area of McClain County, Oklahoma. Cellar and pits have been dug. Goal of the test is the Ordovician, which geologists say may not be found under 12,000 ft.

**C. A. Martin**, Carlsbad, N. M., has been given contract to drill Argo Oil Corp. 1 State, location for which has been staked in C NE NE 22-15n-29e, Apache County, Arizona. The well is 15 miles north of St. Johns on the Zuni River dome. Contractor will use cable tools.

**Mac Drilling Co.**, Houston, Tex., is rigging up for 2 Cinco ranch, to be drilled for Stanolind Oil & Gas Co. in the Clodine field, Fort Bend County, Texas. The contractor is building derrick for another Stanolind well, 3 Parker, above Silsbee, in Tyler County. Mac is completing 2 Gips, a semi-wildcat in the Nordheim area of De Witt County, at 8,399 ft., for Tide Water Associated Oil Co. and is removing derrick at 2 Roemer & Modglin, which it finished a well for Tide Water in the Dyersdale field, Harris County, at 4,082 ft. This contractor is at 3,200 ft. on Houston Oil Co. 1 Cinco, in the Clodine field, Fort Bend County.

**Everts Drilling Co.**, Dallas, Tex., and Louis F. Green, of Albany, Tex., will drill the 1 J. H. M. Commons, 1,775-ft. wildcat 4 miles southeast of Leuders, Tex. Location is 330 ft. out of northwest corner of 322-acre tract, Lot 8-4, A. W. Hill Survey.

WORTH WAITING FOR BUT NO WAITING IS NECESSARY

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# PERSONALS

O. J. HAYNES

## Veteran of 20 Years Made Production Superintendent

O J. HAYNES, Standard Oil Co. of California, has been appointed superintendent of exploration in the southern district producing department, a newly created post.

Mr. Haynes was first employed by the Standard of California on August 28, 1923, in what then was known as the bureau of education of the personnel department, at San Francisco, Calif. In June 1924 he was transferred and promoted to a clerkship in the land and lease division of the producing department. He continued to work in that division as title clerk and chief clerk until January 1, 1928, when he was promoted to leaser and transferred to Los Angeles district. He continued in that capacity until October 21, 1929, when he was transferred to Dallas, in the same capacity, with a Texas operating subsidiary.

On December 16, 1930, he was transferred back to San Francisco as a leaser and continued in that work until June 1, 1937, when he was transferred to the foreign division of the producing department. Subsequently he was sent to the company's London, England, office as land and lease representative. On January 1, 1940, he was transferred to Cairo, Egypt, in the capacity of assistant manager of the company's subsidiary, the South Mediterranean Oil Fields, Ltd.

In October, 1941, he returned to this country and was transferred back into domestic work as a leaser in the home office and then as a representative of the land and lease division at Bakersfield. He continued in that capacity until his present promotion.

**Alfred H. Curry,** formerly surveyor for Shell Oil Co., Inc., in the Los Angeles, Calif., office, has been promoted to foreman of construction and maintenance in the production department of the San Joaquin division.

**Charles Hansen,** Ventura, Calif., has been promoted to drilling foreman for Shell Oil Co., Inc., in the Ventura district, coastal division.

**Fred M. Carroll,** assistant to the chief area mechanical engineer, Shell Oil Co., Inc., was elected president of the Engineers Club of Tulsa at a meeting of the organization on May 17. He had been vice president in charge of programs. **Ray E. Carroll,** chief engineer, Unit Rig & Equipment Co., is executive vice president, succeeding **C. V. Millikan,** chief engineer of Amerada Petroleum Corp., who is a new director.

**R. A. Brown, Sr.,** oil operator of Calgary, Alta, has been elected to the executive committee of the Alberta Petroleum Association, succeeding his son, **R. A. Brown, Jr.,** who recently enlisted in the Royal Canadian Navy.

**Blaine A. Harrison,** operator in charge of cracking at Shell Oil Co., Inc.'s Martinez, Calif., refinery, has been promoted to assistant manager of the cracking department at that plant.

R. L. BOSWORTH

**R. L. Bosworth,** treasurer, and **W. S. MacMillan,** recently appointed manager of the production and drilling department east of the Rocky Mountains, last week were elected vice presidents of Continental Oil Co., Ponca City, Okla. Mr. Bosworth, formerly manager of the New York office, had been treasurer of the company for a year and will continue in that position in addition to assuming duties of a vice president. Mr. MacMillan was appointed manager of the production and drilling department May 1, 1943.

**Cyril C. McKenna,** technologist at the Martinez refinery of Shell Oil Co., Inc., has been promoted and transferred to similar functions at the company's Wilmington, Calif., refinery.

**Dr. Paul D. Foote,** executive vice president of Gulf Oil Corp.'s research and development organization, has been elected a member of the National Academy of Sciences. The academy, which has a membership of 350 of the country's leading scientists, selects its members annually on a basis of recognition of scholarship and professional eminence. Dr. Foote was educated at Western Reserve University, at the University of Nebraska, and at the University of Minnesota, where he received his doctorate in 1917. He was president of the American Physical Society in 1933, vice president of Washington Academy of Science in 1936, and is the author of numerous articles and books on the subject of physics and its industrial applications. Prior to going to Pittsburgh, Pa., in 1927 to become head of the Gulf's research division, Dr. Foote was senior physicist at the National Bureau of Standards in Washington.

**Rulon W. McOmie,** acting assistant refinery manager at Shell Oil Co., Inc.'s Martinez plant has been promoted to fill the same position at the company's Wilmington, Calif., refinery.

**L. S. Reid,** formerly associate professor of chemical engineering at the University of Oklahoma, Norman, Okla., has joined the Southern Natural Gas Co. as assistant chief engineer and will be located at Birmingham, Ala. Since graduating from Iowa State in 1931, Mr. Reid has been employed in various capacities by the Phillips Petroleum Co., Black, Sivalls & Bryson, and the Lion Oil & Refining Co.

**H. H. Kapner,** Deep Rock Oil Co., Tulsa, has been transferred to Mount Vernon, Ill., where he will function as Illinois district geologist.

**H. M. Townsend,** geologist, formerly stationed at Salem, Ill., has been transferred to the Texas Co.'s Evansville, Ind., office.

**Felix A. Runion,** assistant head of the statistical and evaluation section in the geological department of Humble Oil & Refining Co., Houston, Tex., and **Carl F. Murray,** assistant advertising manager of Houston Lighting & Power Co., have been commissioned captains in the Texas State Guard. Both are plans and training officers in their respective units.

**Capt. John D. Smith,** Houston, Tex., petroleum engineer, has entered the preflight school at Maxwell field, Alabama, to receive ground training in preparation for pilot service. Captain Smith, following graduation from Texas A. & M. College in 1937, was employed in the production department of Sun Oil Co. as a junior petroleum engineer. Later he joined his father, **T. L. Smith, Jr.,** president of Smith Salvage Co., as petroleum engineer and superintendent of operations in the West Columbia field, Brazoria County, Texas.

**M. C. Fontenot,** formerly exploitation engineer in charge of the Sheridan district headquarters, Colorado County, Texas, for Shell Oil Co., Inc., has been moved to Mercy as district superintendent. He takes the place of **J. O. Hardy,** who is on an indefinite leave of absence owing to illness. **K. R. Bowie** succeeds Mr. Fontenot at Sheridan.

**Second Lt. George I. Poole, Jr.,** who was utility man in laboratory development at the Baytown, Tex., refinery of Humble Oil & Refining Co. until he entered war service, is now a pilot in the Army Air Force at Freeman Field, Indiana. He completed his civil aeronautics training in the University of Houston.

**A. L. Harder** has been made district clerk at Erath, Vermilion Parish, Louisiana, for Texas Co. He had been in the accounting department of the company's New Orleans office.

**Robert Jemison,** employed in the exploration geophysical department of Shell Oil Co., Inc., Houston, Tex., when he entered military service last August, was commissioned a second lieutenant at Camp Davis, North Carolina, in the Coast Artillery after completing the officers candidate course and he has been assigned to Camp Callan, California.

**John R. Suman,** vice president and director of Humble Oil & Refining Co., Houston, Tex., has been named chairman of the committee on arrangements for the sixth annual South Texas oil men's meeting and banquet to be held June 2 at San Antonio, under the sponsorship of the South Texas Chamber of Commerce. **Al Buchanan,** San Antonio, is vice chairman. Other committee appointments are: Reception, **Henderson Coquat,** San Antonio, chairman, and **Guy I. Warren,** Corpus Christi, vice chairman; entertainment, **J. W. Gorman** chairman, and **L. M. Lockhart** vice chairman, both of San Antonio. **D. A. Little,** president Magnolia Petroleum Co., Dallas, and **F. M. Frasher,** president Duval Petroleum Co., San Antonio, have been selected as oil-industry leaders to be honored at the meeting.

**A. J. Viets,** who has been land man at Corpus Christi, Tex., for Sun Oil Co., has been promoted to district land man for the company and assigned to Brenham, Tex. Mr. Viets was formerly in the Wichita Falls office of Sun, and left there in 1933.

**R. S. Brennand, Jr.,** has resumed duties at Midland, Tex., as district land man for Standard Oil Co. of Texas, following his receiving an honorable discharge from the Army.

**Earl A. Smith,** for the past 6 years superintendent of the Canadian Oil Co., Ltd., refinery at Petroleo, Ont., has been loaned to the Dominion Government for the duration of the war, to take charge of the government oil development project in the tar sand area of northern Alberta. He is succeeded as plant superintendent by **Vincent Norwood,** chief engineer for the company since his graduation from the School of Practical Science at Toronto in 1936.

**Robert E. Garrett,** consulting geologist, this week was named president of the Tulsa Geological Society, succeeding **Dr. G. S. Dille. Dr. J. V. Howell,** consulting geologist, was named first vice president; **Jerry Upp,** Amerada Petroleum Corp., second vice president; **James A. Price,** W. C. McBride, Inc., secretary-treasurer, and **Ray Ginter,** Ginter Laboratories, editor.

**C. H. Rankin** has resigned from the Continental Oil Co. to engage in consulting practice. Mr. Rankin has been with the Continental for the past 14 years, 7 years in the geological department at Denver and for the past 7 years in the production department as foreman and district superintendent in Oklahoma, New Mexico, Colorado and Texas.

**Walter Crandall** has been appointed division engineer for Sinclair Prairie Oil Co. with headquarters at Tulsa. His former position at Oklahoma City has been assumed by **V. B. Bottoms.**

**G. G. Bauer** has been named executive secretary of the Bradford (Pa.) district, Pennsylvania Oil Producers Association. He has been connected with the association since 1931 in an editorial capacity, and will continue to serve as editor of the Producers Monthly, official publication of the group.

**John F. Winchester,** New York, manager of the automotive department of the Standard Oil Co. of New Jersey, and **Leo Huff,** Chicago, Ill.,

*J. F. WINCHESTER*

*LEO HUFF*

chief transportation engineer for Pure Oil Co., have been appointed consultants to the petroleum carriers section, Division of Motor Transport, Office of Defense Transportation. Mr. Winchester is in ODT's Washington, D. C., office and Mr. Huff will remain in Chicago.

**Langdon C. Tennis,** formerly geologist at Midland, Tex., has been promoted to first lieutenant at the Army Air Forces Avon Park, Fla., bombing range.

**George Miller,** scout for Lone Star Gas Co. at Shamrock, Tex., has been elected president of the Panhandle Oil Scouts Association to fill the vacancy caused by the transfer of **T. M. Crawford,** of Humble Oil & Refining Co., to Georgia. **Larry Melzer,** scout for Stanolind Oil & Gas Co., was elected secretary-treasurer of the organization when **Jack Leveritt** received his Army call to report at Fort Sill, Oklahoma.

At the annual meeting of the Ohio Fuel Gas Co. held at the home office, at Columbus, Ohio, **C. I. Weaver** was reelected president of the company and **E. M. Tharp,** vice president and general manager. Other officers elected are: **I. A. Ludwig** and **P. S. Clapp,** vice presidents; **W. N. Grinstead,** treasurer; **E. D. Bivens,** and **C. L. Langenberg,** assistant treasurers; **P. A. Alberty,** secretary; **W. N. Grinstead** and **H. C. Lytle,** assistant secretaries. Directors elected are **C. I. Weaver, E. M. Tharp, T. H. Kerr, W. L. McCloy, W. N. Grinstead, E. D. Bivens, P. A. Goessler** and **L. A. Seyffert.** Mr. Kerr and Mr. McCloy retired as vice presidents, but will continue as directors of the corporation. Mr. Ludwig, manager of the company's operations at Toledo, is a new vice president. All officers and directors are from Columbus except Mr. Ludwig of Toledo, and Mr. Bivens and Mr. Goessler of New York City.

# Market Developments

## East Coast

NEW YORK.—Signs of improvement in the East Coast oil supply situation are still lacking despite assurances some weeks ago that the then-critical position of gasoline would be bettered during May. Instead of improving, the situation with respect to motor fuel remains acute as it does with all petroleum products. The over-all situation was indicated by the A.P.I. index of supplies available for civilian consumption which declined to a new low of only 25.5 per cent of "normal." Lack of gasoline was so acute that the operation of farm vehicles was reported jeopardized and steps are under way to insure New York and New England area farmers sufficient supplies to maintain full operations.

The situation south of New York-Philadelphia refining area was reported to be substantially improved as a result of the inauguration of operations on the Plantation Pipe Line extension which is delivering an additional 30,000 bbl. per day to that area. Disclosure of the fact that a pipe line from Albany to Boston is under consideration gave evidence that the supply situation with respect to New England was still considered serious, and that it will again be the major problem next winter.

Announcement by the major supplier of Pennsylvania Grade crude oil that refinery purchases would be prorated to 85 per cent of May deliveries in June and to 80 per cent in July presaged a tightening in bright-stock market in the near future.

## Mid-Continent

OPERATING adjustments were made promptly last week reflecting the modification of PAW regulations on the percentage of gasoline recoverable on Mid-Continent runs to stills. Refiners quickly availed themselves of the permission to manufacture up to 85 per cent of their average output during the last half of 1941. Previously, PAW had restricted motor-fuel production to 70 per cent of the 1941 output and this was proving inadequate to cope with current demand.

Calls for motor fuel, particularly third-grade material, are acute from the agricultural districts. Tractors are being used more extensively, both numerically and in hours of operation than at any time in history.

It is not yet certain just how securely small refiners are resting in the present situation. Crude shortages continue at practically all Mid-Continent plants. PAW is committed to a program of obtaining maximum production of war materials. Refiners lacking facilities with which to produce the war products would be the first to yield if crude supplies continue their downward trend.

Shortage of products is most acute in residual fuel oils. Refiners are unable, in most instances, to meet shipping instructions of contract customers much less participate in filling spot-market inquiries.

Other products remained unchanged this week. Refiners reported motor-fuel production in approximate balance with artificially depressed consumption and that the summer opportunities to rebuild distillate-fuel stocks is welcomed in all quarters.

## Gulf Coast

HOUSTON, Tex.—Difficulty in obtaining gasoline supplies was increasingly pronounced this week. Buyers in some cases had to do much shopping around before they were able to place large orders. There was no notable loosening in any part of the refined-oil market, although some buyers of No. 2 heating oil were asking that gasoline be shipped instead.

Indicative of the pressing demand for oil products of every sort is the fact that the 12 independent refiners who comprise the Gulf Coast Refiners Association ran 1,250,000 bbl. of crude to stills in the second half of April without increasing their inventories of any grade of gasoline and with a reduction in their stocks of all products from 4,280,000 bbl. to 4,126,000 bbl. Refiners are virtually at tank bottoms on some products. Organized independents of the Gulf Coast had only 99,000 bbl. of Bunker C fuel oil on May 1. And of kerosene, for which there has been a mad scramble for several months, there was only 67,000 bbl., in contrast with the 500,000 bbl. usually on hand in normal times.

The most sought grade of gasoline is the 80-octane all-purpose, huge quantities of that material being moved to fill Army and Navy requirements. Large shipments of it to distributing points are made in drums and "blitz" cans. Freight cars are employed, thus helping to relieve the shortage of tank cars.

## Pacific Coast

LOS ANGELES, Calif. — Gasoline prices continue to show a wide margin but very little is moving in the open market. Prices for Pacific Specification 400 fuel oil continue below ceiling levels and consequently very little is moving. The demand for fuel oil last month reached the highest point attained in the present market. This undoubtedly reflects increased production of heavy grades of crude oil resulting from aggressive drilling in San Joaquin Valley fields. There is every reason to believe that a further increase in fuel-oil demand will take place later this year and certainly when naval activities are stepped up in the South Pacific. Independent refiners having empty tankage, rather than accept 95 cents per barrel for straightrun residuum, are building up stocks.

The Defense Plant Corp., through Rubber Reserve Corp., has started taking deliveries of charging stock for California butadiene plants but the peak will not be reached for another 60 days.

Southern California Gas Co. will begin operation of its butadiene unit within the next few days. Preliminary heating has been under way for a week.

When all butadiene plants in California reach maximum operation by late September they will absorb a substantial amount of gasoline and other light products. Butadiene from Southern California Gas Co.'s unit in Los Angeles will be moved by pipe line to the major installation at Torrance which will be operated by Shell Chemical Co. and Dow Chemical Co.

## A.P.I. REFINERY REPORT

**Week Ended May 8, 1943**

(Figures in thousands of barrels)

| | Dly. crude runs to stills | Stocks: Gasoline | Stocks: Residual | Stocks: Gas oil |
|---|---|---|---|---|
| Appalachian | 152 | 2,446 | 451 | 809 |
| Ind., Ill., Ky. | 762 | 19,098 | 3,100 | 3,930 |
| Okla., Kan., Mo. | 345 | 6,894 | 1,498 | 1,632 |
| Censored area* | 1,718 | 36,560 | 10,557 | 13,229 |
| Rockies | 80 | 2,005 | 521 | 334 |
| California | 698 | 21,363 | 51,450 | 11,729 |
| Total 5-8-43 | 3,755 | 88,166 | 67,577 | 31,663 |
| Total 5-1-43 | 3,849 | 90,029 | 66,991 | 31,202 |
| Total 5-9-42 | 3,400 | 100,780 | 70,593 | 29,110 |

*Reports combined on East Coast, Texas Gulf, Louisiana-Arkansas and Inland Texas at request of PAW.

**CRUDE-OIL STOCKS**

(Bureau of Mines Estimate)

| Week ended: | Bbl. of crude* |
|---|---|
| May 8, 1943 | 240,775,500 |
| May 1, 1943 | 242,916,000 |
| May 9, 1942 | 255,185,000 |

*Excludes unrefinable California stocks.

# Refinery Prices

(Prices as of May 18)

Quotations are f.o.b. plant in cars and in cents per gallon except where otherwise noted. They are exclusive of the federal excise taxes of 1.5 cents a gallon on gasoline and 4.5 cents a gallon on lubricating oils, and do not include marine lighterage charges.

## REFINERY GASOLINE

| Octane (A.S.T.M.): | †80 | 74-76 | 72-74 | 68-70 | 63-66 |
|---|---|---|---|---|---|
| Mid-Continent* | | | 5.875-6.000 | | 5.500-5.625 |
| Pennsylvania | | 6.750-7.000 | | | |
| Gulf Coast‡ | 6.00-6.50 | | §5.750-6.250 | §5.750-6.250 | §5.250-5.750 |
| Northeast Coast | 9.80 | | 9.2 | 9.2 | |
| California | | 6.125-6.500 | 6.000-6.125 | 5.500-6.000 | 5.000-5.250 |

*Basis Group 3. †1939 C.F.R. (research method). ‡Integrated companies restricted to lowest prices. §Unleaded.

## KEROSENE AND NO. 1 FUEL OIL

| Gravity: | 46 | 45 | 42-44 | 41-43 | 38-40 |
|---|---|---|---|---|---|
| Mid-Continent* | | | 4.500 | 4.375 | |
| North Louisiana | | | | 4.500-4.750 | |
| Pennsylvania | 6.250-6.625 | 6.125-6.250 | | | |
| California | | | | 4.500-5.500 | 4.250 |
| Northeast Coast | | | | 6.80 | |
| Gulf Coast | | | | 4.125 | |

*Basis Oklahoma Group 3.

## TRACTOR, DIESEL, AND BUNKER FUEL OIL

| Specifications: | 46-48° G. | 24 D.I. | 48-52 D.I. | 56 & above | Diesel bunkers | Residual Bunker C§ |
|---|---|---|---|---|---|---|
| Mid-Continent* | 4.125 | | | | | $0.80-1.27 |
| California | | 2.750-4.000 | | | ‡1.45-1.50 | 0.95-1.00 |
| Gulf Coast | | | 4.000 | 4.125 | 1.45 | 0.85-1.27 |
| Northeast Coast | | | | 6.800 | 2.780 | 1.65-2.07 |
| North Louisiana | | | | | | 0.80-1.27 |

*Basis Oklahoma Group 3. †10-14° gravity. ‡Pacific Specification 200. §Gravity range.

## FURNACE OIL, GAS OIL, FUEL OIL

| | No. 2 | No. 3 | No. 5 | No. 6 |
|---|---|---|---|---|
| Mid-Continent* | 3.625-3.750 | 3.500-3.625 | $0.85 | $0.80 |
| Pennsylvania (West) | 5.875-6.125 | 5.875-6.000 | †5.250-5.500 | |
| Northeast Coast | 6.7 | 6.7 | 1.95 | 1.65 |
| California | 5.5 | 5.5 | ‡1.10-1.25 | §1.10-1.15 |
| Gulf Coast | 3.875-4.0 | | 1.65 | 0.85 |

*Basis Oklahoma Group 3. †36-40 gravity fuel. ‡Pacific Specification 300. §Pacific Specification 400.

## NATURAL GASOLINE

| Grades: | 26-70 | 18-55 |
|---|---|---|
| Oklahoma (Group 3) | 3.875 | 4.650 |
| North Texas | 3.500 | 4.200 |
| North Louisiana | 3.625 | 4.350 |
| California | 4.875 | 5.500 |

## LUBRICATING OILS

**Bright and Steam Refined**

**OKLAHOMA (Group 3)—**

| | | |
|---|---|---|
| 200-210 D, 10-25 | | 27.00 |
| 150-160 D, 0-10 | | 23.00 |
| 120-125 D, 0-10 | | 22.00 |
| Steam refined: | | |
| 600 dark green (untreated) | 9.00 | 9.50 |

**PENNSYLVANIA—**

| | | |
|---|---|---|
| Bright Stocks (Pennsylvania Grade No. 8 color, 140-150 at 210, 545-550 flash) | | |
| 10 pour point | | 30.50 |
| 15 pour point | | 29.50 |
| 25 pour point | 25.00 | 28.00 |
| Steam refined: | | |
| 600 | 15.00 | 16.00 |
| 650 | 15.50 | 16.50 |
| 600 flash | 16.00 | 17.50 |
| 650 flash | 17.00 | 17.50 |

**Neutral Oil**

(Vis. at 100° F. except Pennsylvania and color N.G.A.)

**OKLAHOMA (Group 3)—**

| | |
|---|---|
| 0-10 pour point: | |
| 300-3 | 15.00 |
| 300-3 | 18.00 |
| 500-3 | 19.50 |
| 600-3 | 20.00 |

Note: Viscous neutrals, 10-25 pour, quoted 0.5 cent under 0-10 oils.

**Neutral Oils**

**CALIFORNIA—**

| Pale Oils: | | |
|---|---|---|
| 200-2½-3 | 7.00 | 7.75 |
| 400-3-4 | 7.25 | 8.00 |
| 600-3-4 | 8.75 | 11.00 |
| Red oils: | | |
| 200-4-5 | 7.00 | 7.75 |
| 400-5-6 | 9.00 | 11.00 |
| 500-900, 5-6½ | 9.25 | 11.25 |

**GULF COAST—**

| Pale oils: | | |
|---|---|---|
| 200-3 | 8.50 | 8.75 |
| 300-3 | 9.00 | 9.25 |
| 500-3½ | 9.75 | 10.00 |
| 750-3½ | 10.00 | 10.25 |
| 2,000-4 | 10.50 | 11.00 |

**PENNSYLVANIA—**

| 150 vis. at 70° F., 3 color, 400-405 flash: | |
|---|---|
| Zero pour point | 37.50 |
| 10 pour point | 36.50 |
| 15 pour point | 35.50 |
| 25 pour point | 30.00 |
| 200 vis. at 70° F., 3 color: | |
| Zero pour point | 39.50 |
| 10 pour point | 38.50 |
| 15 pour point | 37.50 |
| 25 pour point | 32.00 |

## WAX

(Cents per pound)

| | |
|---|---|
| **OKLAHOMA (Group 3)—** | |
| 124-126 (A.m.p.) w.c. scale | 4.250 |
| **PENNSYLVANIA (inland refineries)—** | |
| 122-124 (A.m.p.) w.c. scale | 4.250 |
| 124-126 (A.m.p.) w.c. scale | 4.250 |
| **NEW YORK—** | |
| Wax in bags fully refined: | |
| 130-132 (A.m.p.) wax | 5.850 |
| 133-135 (A.m.p.) wax | 6.150 |
| Crude scale: | |
| 124-126 (A.m.p.) w.s. | 4.250 |
| 124-126 (A.m.p.) y.s. | 4.250 |

## TANK-WAGON PRICES IN 50 CITIES

(Gasoline prices based on regular grades tax included, undivided dealer)

**ATLANTIC AND NEW ENGLAND**
(Socony-Vacuum Oil Co., Inc., and Atlantic Refining Co.)

| | Dealer tank wagon | Combined tax | Kero tank wag |
|---|---|---|---|
| Baltimore, Md. | 15.95 | 5.50 | 10.30 |
| Boston, Mass. | 14.90 | 4.50 | 9.80 |
| Burlington, Vt | 16.90 | 5.50 | 10.10 |
| Buffalo, N. Y. | 16.20 | 5.50 | 10.60 |
| Dover, Del | 16.70 | 5.50 | 12.00 |
| Hartford, Conn. | 15.60 | 4.50 | 9.70 |
| Manchester, N. H. | 17.20 | 5.50 | 10.80 |
| Newark, N. J. | 15.20 | 4.50 | 9.70 |
| New York, N. Y. | 16.10 | 5.50 | 9.80 |
| Philadelphia, Pa. | 16.20 | 5.50 | 11.65 |
| Pittsburgh, Pa. | 16.70 | 5.50 | 12.00 |
| Portland, Me. | 16.30 | 5.50 | 9.90 |
| Providence, R. I. | 15.00 | 4.50 | 9.80 |
| Washington, D. C. | 15.20 | 4.50 | 11.00 |
| Average 14 cities | 16.02 | 5.14 | 10.49 |

(All prices undivided dealer basis.)

**CENTRAL**
(Standard Oil Co. of Indiana, Standard Oil Co. of Ohio, Continental Oil Co., and Texas Co)

| | Dealer tank wagon | Combined tax | Kero tank wag |
|---|---|---|---|
| Chicago, Ill. | 13.40 | 4.50 | 10.30 |
| Cleveland, Ohio | 15.00 | 5.50 | *9.00 |
| Dallas, Tex. | 13.00 | 5.50 | 7.00 |
| Des Moines, Iowa | 14.40 | 4.50 | 9.80 |
| Detroit, Mich | 14.40 | 4.50 | 9.80 |
| Fargo, N. D. | 16.90 | 5.50 | 11.30 |
| Huron, S. D. | 16.30 | 5.50 | 10.70 |
| Indianapolis, Ind | 15.20 | 5.50 | 9.80 |
| Little Rock, Ark. | 17.50 | 6.00 | 10.00 |
| Milwaukee, Wis. | 16.10 | 5.50 | 10.30 |
| Minneapolis, Minn. | 15.40 | 5.50 | 10.30 |
| Omaha, Neb. | 15.40 | 6.50 | 9.80 |
| Tulsa, Okla. | 16.50 | 7.00 | 8.50 |
| Wichita, Kans. | 12.70 | 4.50 | 8.00 |
| Average 14 cities | 15.15 | 5.57 | 9.81 |

*Includes 1-cent state tax.

**SOUTHEASTERN**
(Standard Oil Companies of New Jersey, Kentucky, and Louisiana)

| | Dealer tank wagon | Combined tax | Kero tank wag |
|---|---|---|---|
| Atlanta, Ga. | 18.90 | 7.50 | *11.50 |
| Birmingham, Ala. | 18.50 | 8.50 | 9.00 |
| Charleston, S. C. | 18.95 | 7.50 | |
| Charleston, W. Va. | 19.25 | 6.50 | 13.30 |
| Charlotte, N. C. | 20.10 | 7.50 | 11.30 |
| Jacksonville, Fla | 18.90 | 8.50 | 9.50 |
| Jackson, Miss. | 17.50 | 7.50 | †9.00 |
| Louisville, Ky. | 16.50 | 6.50 | 8.50 |
| Memphis, Tenn. | 17.90 | 8.50 | 10.50 |
| New Orleans, La. | 17.75 | 8.50 | *10.00 |
| Norfolk, Va. | 17.45 | 6.50 | 13.00 |
| Average 11 cities | 18.34 | 7.50 | 10.48 |

*Includes 1-cent state tax.
†Includes ½-cent state tax.

**MIDWESTERN**
(Continental Oil Co.)

| | Dealer tank wagon | Combined tax | Kero tank wag |
|---|---|---|---|
| Albuquerque, N. M. | 17.50 | 7.50 | 10.00 |
| Boise, Idaho | 20.10 | 6.50 | 16.80 |
| Casper, Wyo. | 17.00 | 5.50 | 12.00 |
| Denver, Colo. | 14.50 | 5.50 | 11.00 |
| Helena, Mont. | 17.00 | 6.50 | 13.00 |
| Phoenix, Ariz. | 18.50 | 6.50 | 12.50 |
| Reno, Nev. | 17.50 | 5.50 | 13.50 |
| Salt Lake, Utah | 18.50 | 6.50 | 14.50 |
| Average 8 cities | 17.58 | 6.25 | 12.98 |

**PACIFIC COAST**
(Standard Oil Co. of California)

| | Dealer tank wagon | Combined tax | Kero tank wag |
|---|---|---|---|
| Portland, Ore. | 17.00 | 6.50 | 13.50 |
| San Francisco, Calif. | 14.50 | 4.50 | 11.50 |
| Seattle, Wash. | 17.00 | 6.50 | 13.50 |
| Average 3 cities | 16.17 | 5.83 | 12.83 |
| Average 50 cities | 16.55 | 5.96 | 10.76 |

## SCHEDULE E, P-98-b, AMENDED (Continued from Page 48)

This schedule both describes and determines how to obtain the delivery of material for and authority to use material in construction operations.

Schedule E shall not determine the methods by which an operator obtains delivery of, acquires or uses MRO material or material for production operations. Requirements governing the use of priorities assistance to secure delivery of and use MRO material are treated in Subsection 2 and Schedules A, C and D. Requirements governing the use of priorities assistance to secure delivery of material for production operations are treated in Subsection 3; the use of material in production operations is covered in PAO 11.

The requirements in this schedule with respect to applications for authorization to accept delivery of or acquire material and to initiate a construction operation (but not with respect to obtaining priorities assistance) do not apply to any Canadian operator.

For the purpose of this Schedule E, "material on hand" means any material

(1) which has been or can be obtained without priorities assistance (other than priorities assistance assigned by subparagraph (b) (1) of M-208); or

(2) which has been acquired with priorities assistance (other than priorities assistance made available by this order to secure delivery of MRO material) for a purpose other than use in the construction operation for which application must be made on the appropriate form specified in Column 4 below; and

(3) which will not be replaced in the operator's inventory by the use of priorities assistance made available by this order to secure delivery of MRO material.

For further definitions of the terms used in the table below consult the respective orders referred to therein.

In addition to the orders specified, the terms of any other applicable E, L, M, or U order shall apply.

| (1) Petroleum industry operations | (2) Construction operations covered by this schedule | (3) Extent of authorization required and method of obtaining authorization | (4) Use form below to obtain authority to engage in a construction operation, if required | (5) Use form below to obtain priorities assistance | (6) Order which governs the need to obtain authority |
|---|---|---|---|---|---|
| **Marketing** | Any construction operation, as defined in P-98-b, to the extent covered by PAO 12 or M-68-c. | (1) Authority is granted by PAO 12 to undertake certain construction operations and installations of equipment. As to such operations or installations, no action need be taken.<br>(2) Authority must be obtained before undertaking any construction operation or installation of equipment other than those specifically permitted by PAO 12. To request authority, file Form PD-215 (Revised) with the District Director of Marketing at the PAW district office for the district in which the material will be used. | **PAW Form 23 or Form PD-215 (Revised)** | Form PD-200 | PAO 12 or M-68-c |
| **Natural gasoline production** | Any construction operation as defined in P-98-b (any production operation as defined in PAO 11 directly incident to the extraction or recovery of natural gasoline and associated hydrocarbons). | Authority must be obtained under PAO 11 before engaging in any such construction operation. To request authority, file PAW Form 4 as follows:<br>Three copies with the Director of Natural Gas and Natural Gasoline, Petroleum Administration for War, Washington, D. C.<br>One copy with the District Director of Natural Gas and Natural Gasoline, PAW district office. | **PAW** Form 4 | Form PD-200 | PAO 11 |
| **Refining or transportation** | (a) Any construction operation, as defined in P-98-b, with an estimated material cost of less than $3,000 for any one complete operation, which can be completed primarily with material on hand. | Any operator, to the extent that he is engaged in refining or transportation, may undertake any construction operation as described and limited in Column 2 without obtaining any authority to do so. | | | P-98-b Schedule E |
| | (b) Any construction operation, as defined in P-98-b, with an estimated material cost of $3,000 or more for any one complete operation, which can be completed primarily with material on hand. | No operator, to the extent that he is engaged in refining or transportation, may undertake any construction operation described and limited in Column 2 unless he obtains prior authority to do so from the Petroleum Administration for War. To request such authority, file Form PD-200 with the PAW, Washington, D. C. | Form PD-200 | | P-98-b Schedule E |
| | (c) Any construction operation, as defined in P-98-b, the delivery of material for which will require priorities assistance. | No operator, to the extent that he is engaged in refining or transportation, may undertake any construction operation described in Column 2 unless he obtains prior authority to do so from the Petroleum Administration for War. To request such authority, file Form PD-200 with the Petroleum Administration for War, Washington, D. C. | Form PD-200 | Form PD-200 | P-98-b Schedule E |

FOOTNOTES—READ CAREFULLY

1. USE OF FORM PD-200B.—After an operator has filed a Form PD-200 and has been authorized to construct or has been granted priorities assistance, Form PD-200B should be used (1) to obtain priorities assistance for additional material; (2) to obtain greater quantities of material than authorized by the priorities assistance granted; or (3) to obtain a higher preference rating than the rating granted, if such is necessary to secure delivery of material at the time required.

2. FORM PD-200 USED FOR BOTH AUTHORITY AND PRIORITIES ASSISTANCE. Where both authority to initiate a construction operation and priorities assistance are required and Form PD-200 is prescribed for both purposes, it is only necessary to file such Form PD-200 once for both purposes.

3. WHERE TO FILE FORMS PD-200 AND PD-200B.—Domestic operators should file with the Washington office of the Petroleum Administration for War; Canadian operators should file with the Office of Oil Controller.

4. WHEN TO FILE FORMS.—Form PD-215 (Revised), PAW Form 23, PAW Form 4, and Form PD-200 (when it is used to obtain authority to initiate a construction operation) must be filed before construction or installation is begun. Where Form PD-200 is used to obtain priorities assistance only, it should be filed at the earliest possible opportunity and preferably with Form PD-215 (Revised), PAW Form 23, or PAW Form 4, if authority to initiate a construction operation in marketing or natural gasoline production is to be requested.

5. FILING OF FORM CMP-4C.—Not required of operators except where specifically requested by the Petroleum Administration for War or the Office of Oil Controller.

# Equipment Progress

## New Cleaner for Small Tubes

O. J. Bagnoli, vice president and general manager of Thomas C. Wilson, Inc., 21-11 Forty-fourth Avenue, Long Island City, N. Y., announces the development of an entirely new and revolutionary type of tube cleaner on which patents are pending.

The new tube cleaner was especially designed to clean the small-diameter tubes (⅜-in. to 1¼-in. i.d.) used in condensers, heat exchangers and similar apparatus.

The new tube cleaner operates at high speed and uses a "cutter-bit" which, it is stated, will not clog or jam so as to damage or break either the shaft or the cutter bit itself. Its unusually high operating speed enables tubes which heretofore were considered unprofitable to clean because of the time and trouble involved, to be cleaned quickly and economically. Entire bundles of tubes can be cleaned in a very short time, and frequently the removal of tube bundles from the shell is unnecessary. This latter feature is of the greatest value under the stress of wartime production, when every minute that a heat exchanger is down for cleaning means a delay in plant production. In removing either soft, gummy or moderately hard deposits, the new cleaner operates at speeds never before obtainable in the cleaning of small-diameter tubes.

In conjunction with the development of the new tube cleaner, the Wilson engineers have designed an attachment which gives to the cutter bit the combined movement of a rotary tube cleaner and a percussion hammer, by adding to the rotation of the cutter bit a series of blows which quickly break up the hardest deposit, and also assist the cutter bit to obtain a bite on the deposit. The attachment is operated by the air or steam used as the scavenging agent in the tube cleaner. Its use is also recommended for cleaning either partially or totally plugged tubes in which an especially hard deposit is encountered.

## Carrier Equipment in SONJ Bayway Refinery

Production of synthetic rubbers and important solvents is made possible at the Bayway, N. J., refinery of Standard Oil Co. of New Jersey by two Carrier centrifugal refrigeration machines installed recently. Of 350-ton cooling capacity each, the centrifugals supply the cooling needed in the manufacture of isopropyl alcohol, butyl alcohol and di-trimer polymer, which are made from petroleum by the use of low temperature.

The alcohols are converted into acetates and ketones which are widely used as solvents and thinners for lacquers, synthetic resins and varnishes. They also are used as solvents in special chemical processes.

The di-trimer polymer forms the base stock for the manufacture of certain synthetic rubbers and rubber-like substances which play an important role in the manufacture of bullet-proof airplane fuel tanks and high-grade aviations oils. It also provides the base stock for manufacture of heavy-duty engine oil inhibitors, which prevent oil from sludging or oxidizing. This also lowers the freezing point of the oil.

In the same plant Carrier equipment also served in the rubber laboratory, providing consistent temperature and humidity conditions for tests of the tensile strength of synthetic rubber.

## Gold Star Is Added to Kerotest "M" Pennant

The U. S. Maritime Commission, "in recognition of continued outstanding achievement," has added a gold star to the "M" pennant already won by Kerotest Manufacturing Co., Pittsburgh, Pa.

The original "M" award to Kerotest was made last August. Notice of the additional star was made in a telegram from H. L. Vickery, vice chairman of the U. S. Maritime Commission, to E. G. Mueller, Kerotest president.

## New Snubber Calculator Offered by Burgess

A new slide rule, called the Burgess snubber calculator, has been developed by the Acoustic Division of Burgess Battery Co., 2815 West Roscoe Street, Chicago, Ill., as a time saver for engine salesmen and operators in choosing the right size Burgess exhaust snubbers to provide quiet exhausts for their engines. Since the proper selection of a snubber depends upon a number of different factors, it was previously necessary for interested persons to ask Burgess engineers to specify the correct size for each engine. This slide rule makes it easy for any engine operator to make a preliminary selection from the engine data. This selection can then be approved by Burgess engineers who are still available for the more difficult applications.

# Among Equipment Men

## Shipley Elected Board Chairman, Elliott Co.

*GRANT B. SHIPLEY*

Howard M. Hubbard, president of Elliott Co., Jeanette, Pa., manufacturers of power-plant and process equipment, announces the election of Grant B. Shipley as chairman of the board of directors of the company. Mr. Shipley has had a long and successful industrial experience, having started in the shop as a mechanic, then progressing to draftsman, designer, construction engineer, chief engineer, sales engineer, manager. He organized several substantial enterprises, of which he was president and chairman. As an engineer he has been connected with shipbuilding, mining, wood preserving, power-plant equipment, etc.

Mr. Shipley is a director of both International Nickel Co., Inc., and International Nickel Co. of Canada, Ltd., and a member of the latter's executive committee; consultant to Koppers Co. and others. His broad

industrial, engineering, manufacturing and executive experience will be of value to Elliott Co.

## Lefebvre Made President of Cooper-Bessemer Corp.

Gordon Lefebvre has been elected president of Cooper-Bessemer Corp., succeeding B. B. Williams, who remains with the company as chairman of the board. Mr. Lefebvre was formerly vice president and general manager of the company, whose two plants are located at Mount Vernon,

B. B. WILLIAMS

G. LEFEBVRE

Ohio, and Grove City, Pa. He has been associated with the company for the past 19 months. Previous to joining Cooper-Bessemer, he was identified with American Locomotive Co., in charge of the diesel engine division, and with General Motors Corp., where he was in charge of the Pontiac division, and before that in charge of the corporation's activities in Canada. He was a member of the Joint War Production Committee of the Economic Defense Board, at Washington, D. C., where he worked toward coordinating the production of war materials in the United States with that of Canada.

JOHN M. SHIMER

Cooper-Bessemer also announces the appointment of John M. Shimer as research engineer. He will occupy his time with such projects as the adaptation of new materials, conservation of critical materials, and the refinement of design. Mr. Shimer was formerly vice president in charge of engineering with Oil Well Supply Co., and before that, in charge of Wilson-Snyder Manufacturing Corp.'s engineering and manufacturing. He will be located at the company's office in Dallas, Tex.

## Formica Insulation Elects Five New Vice Presidents

Five new vice presidents were recently elected by the Formica Insulation Co. board of directors at the annual stockholders and directors' meeting at Cincinnati.

D. J. O'Conor, company president, was reelected at the meeting. H. A. Faber, cofounder with Mr. O'Conor of the Formica company, was reelected chairman of the board. Other directors reelected were John L. Vest, Mrs. Helen D. Tomlin, Mrs. D. B. Wallace and Mr. O'Conor.

The membership of the board was increased by one with the election of W. J. Gebhart, with the company for 20 years, treasurer since 1936 and also elected vice president in charge of finances and accounting at the meeting.

Other vice presidents elected by the directors are: J. Roger White, in charge of sales and advertising; George H. Clark, in charge of engineering; R. W. Lytle, in charge of special engineering in charge of automotive and aircraft engineering; Ellsworth G. Williams, in charge of manufacturing.

Walter H. Kruse, associated with the company since 1914, office and credit manager since 1928 and assistant secretary since 1936, was elected secretary.

Appointment of Harry Grunewald, associated with the company for 12 years, who worked through the ranks of foreman, night superintendent and assistant manager, to be factory manager was also announced.

## New York Nomads Elect Two Officers

The eight members of the 1943 board of regents of the New York chapter of Nomads last week elected John H. Baird chairman of the board and I. Frank Brown secretary. Both are regents of the New York chapter

## HOUSTON INDUSTRIAL ADVERTISERS GIVEN CHARTER

Allen P. Colby, vice president of the National Industrial Advertisers' Association and advertising manager, National Supply Co., on May 7 presented a national charter to the newly organized Industrial Advertisers' Association of Houston. This is the twenty-seventh chapter of the N.I.A.A. and the first to be organized in the Southwest. Organized with 27 members, the Houston chapter has the second largest charter member roll of the organization's 27 chapters.

It is headed by the following officers: A. B. Penny, advertising manager, Humble Oil & Refining Co., president; Harry Heller, advertising manager, Reed Roller Bit Co., vice president; Lewis A. Thompson, assistant advertising manager, Hughes Tool Co., secretary; and A. S. Volpin of McEvoy Co., treasurer. At the same meeting, which was the first official one of the new organization, the following were elected to serve with the four officers on the board of directors: Earl Brennan, Brennan-Brown Advertising Agency; Kenneth Fellows, Houston Natural Gas Co.; Dick Yancey, Gray Tool Co.; George Forristall, Brochstein's, Inc.; and Robert J. Koch, Morse Chain Co.

*Officers of the Industrial Advertisers Association of Houston receive charter from the National Industrial Advertisers' Association, presented by Allen P. Colby, vice president of the organization. Left to right: A. S. Volpin, McEvoy Co., treasurer; A. B. Penny, advertising manager, Humble Oil & Refining Co., president; Lewis A. Thompson, assistant advertising manager, Hughes Tool Co., secretary; Mr. Colby, and Harry Heller, advertising manager, Reed Roller Bit Co., vice president*

# Classified Advertising

***The Market Place for the Oil Industry***

## UNDISPLAYED RATE

**8 CENTS A WORD, minimum charge $2 per insertion.**

**SITUATIONS WANTED. 4 cents a word, minimum charge $1.**

**BOX NUMBERS, count 9 words when replies are to be sent to our Tulsa Office.**

**10% DISCOUNT if 3 insertions are ordered at one time, with check accompanying order.**

**All classified advertising payable in advance.**

## DISPLAYED—PER INCH

**Classified display advertising set in single or double column style:**

| | | |
|---|---|---|
| 1 inch | 1 time | $7.00 |
| 1 inch | 13 times | 6.50 |
| 1 inch | 26 times | 6.00 |
| 1 inch | 39 times | 5.50 |
| 1 inch | 52 times | 5.00 |

**Rates are governed by total space used within 12 months from date of first insertion. Credits are allowed when lower rates are earned.**

**FORMS CLOSE MONDAY NOON—PUBLISHED EACH THURSDAY**

## LEGAL BLANK

OIL FIELD LEGAL BLANKS
Leases, assignments, releases, township plat books, well records, etc. Request on your letterhead gets free catalog. Olds Press, 218 East Third St., Tulsa, Okla.

## RANCHES AND FARM LANDS

452 ACRE farm located in Woodson County, Kansas. Ideal stock farm, large silo and buildings, gas well on farm. Oil production joins, direct sale a bargain. Reason for disposing, advanced age. Write or call. O. J. Flack, Dwight, Kansas.

## HELP WANTED

INSTRUMENT Maintenance Men wanted. Preferably with oil refinery experience. Acquainted with Foxboro, L & N, Taylor, and Mason-Nielan instruments and controls. For new plant being built, location Texas Gulf Coast. Send photograph and complete experience record. Men now employed in war industries not considered. Box B-561, The Oil and Gas Journal, Tulsa, Okla.

WANTED—Experienced stillmen, pumpers and treaters for refinery with two-coil Dubbs Cracking Unit and crude distillation unit, located in Southern California. Top hourly wages paid with 48-hour work week. Rothschild Oil Company, Santa Fe Springs, Calif.

**REFINERY EQUIPMENT MANUFACTURER**

requires the services of man experienced in fabrication of heat exchangers and pressure vessels for supervisory position. Must know shop practices. Reply giving full details of qualifications. Box B-621, The Oil and Gas Journal, Tulsa, Okla. Applications from those now employed in war industries will not be considered.

**NOTICE TO ADVERTISERS**

**Advertisers offering positions to workers skilled in critical war industries are requested by the War Manpower Commission to include the following sentence in their advertisement:**

**"Applications from those now employed in war industries will not be considered."**

## HELP WANTED

HELP WANTED: Experienced drillers and roughnecks. Need one full crew to run a steam rig and one full crew to run a Diesel rig. Give full particulars of past employment with first letter. Steady work. Reply Contractor, Box B-622, The Oil and Gas Journal, Tulsa, Okla.

SALES REPRESENTATIVE
to sell our comprehensive "overnight by airplane mail" daily reports in Government regulation of the Oil Industry. We seek an executive type salesman who can adapt himself to our methods, who knows something about oil, is accustomed to dealing with industrial executives on their own level and is willing to travel. Compensation will be on a salary and bonus basis, and expense allowances. Write details, qualifications, recent photograph if possible, nonreturnable, to The Bureau of National Affairs, Inc., 2201 M Street, N.W., Washington, D. C.

## SITUATIONS WANTED

EXECUTIVE ACCOUNTANT
Desires permanent position as comptroller or executive accountant of substantial concern. Fifteen years diversified experience in industrial, oil, and public accounting. Considerable system, cost, and tax work. Age 42. Box B-620, The Oil and Gas Journal, Tulsa, Okla.

PRODUCTION FOREMAN, twenty-three years' experience, flush and settled production, sand or lime formation, 300 ft. to 6500 ft. Age 43, family, class 3A(H). Immediately available. Box B-623, The Oil and Gas Journal, Tulsa, Okla.

REFINERY SUPERINTENDENT, 18 years major company experience in design, construction and operation of the latest developments in refinery processes including recovery, precision fractionation, desulphurization, alkylation, catalytic cracking and polymerization of light hydrocarbons, and recent developments in sweet and sour crude distillation and cracking. Desires connection with progressive company engaged in building plant and operating organization. Box B-603, The Oil and Gas Journal, Tulsa, Okla.

## FINANCING

**CAPITAL SEEKERS—Interested in raising $25,000 or more for a legitimate project should write to AMSTER LEONARD, Fox Theater Bldg., Detroit, Mich.**

## PATENT ATTORNEYS

**PATENTS, Trade-Marks. Booklet, "General Information Concerning Inventions and Patents" and "Free Schedule" sent without obligation. Established 1918. Lancaster, Allwine & Rommel, Suite 418, Bowen Bldg., Washington, D. C.**

## EXPLORATION

TORSION BALANCE geophysical surveys contracted. Very reasonable rates. Modern instruments, experienced, capable, torsion balance field personnel. Expert interpretations. Address: Christian Iden, Geophysicist, Box 1589, Willis, Texas, or 1740 Commerce Bldg., Houston, Texas.

## WANTED

COMPLETE Plants, Pipe-Lines, and Industrial Enterprises bought for cash or liquidated for the owners. Wire, phone, or write—INDUSTRIAL SUPPLY & EQUIPMENT CO., INC. 1044 Canal Bldg., New Orleans, La.—MA 5586.

## MONEY RAISING

WANTED: Working capital. Have geological data indicating probable location of several Gulf Coast salt domes or structures. Additional torsion balance stations necessary to correlate data to prove or disprove existence. If you have the money to invest and would be interested in discovering new oil reserves on a participating basis, address: Christian Iden, Geophysicist, Box 1589, Willis, Texas, or 1740 Commerce Bldg., Houston, Texas.

## LEASES AND DRILLING BLOCKS

NEW MEXICO
State Oil and Gas Leases
Forty acres and multiples thereof, in a new HoT spot. 23 oil companies own surrounding leases. Write for information. No obligation. HARRY S. WRIGHT, New Mexico State Lessee, Farmington, N. M.

FOR SALE: Oil property and country estate located in Venango Co., Pa. 430 acres of land, timber, some coal, 21 bbls. of oil daily, no pressure used. 106 oil wells, 7 powers. Complete set of buildings for oil and farm use. Owners home furnished with antiques, etc. Address Owner, 10 West Third St., Oil City, Pa.

OPERATORS: We have large structure cored to gas, completed geological, geophysical, geochemical work indicates production, 2800' drill. Will farm favorable terms. S. W. Pressey, Pueblo, Colo.

IN EAST TEXAS, 6000 Acre oil lease, $2.00 per Acre; 20,000 Acres $1.50 per Acre; both blocks in area that is due for much activity soon. Responsible inquiries invited. Al Ehrlich, 521 East Mary St., Austin, Texas.

WANTED: Associate in Hot Play block of leases, spendid East Texas Balcones Fault Trend. Address P. H. Gunther, 4419 Bowser Ave., Dallas, Texas.

OWNER of rich Texas oil lands will give half interest for drilling and completing an oil well to 4800 feet; 42 grav. at 2235, 3953, 4800 feet—also 5355, 6406. A possible big money deal. Investigate. H. Freels, 237 S. Beaudry Ave., Los Angeles, Cal.

10,000 ACRE oil and gas leases, Holt County, Nebraska. National Rig on location. Need help to develop. L. R. Winn, 2001 West 2nd, Sioux City, Iowa.

**LEASES ROYALTIES**
**PRODUCING OR NONPRODUCING**
**Texas, New Mexico, Oklahoma, Louisiana and Illinois.**
**20 Years' Experience**
**Inquiries Invited**
**B. D. BUCKLEY**
**60 Broadview Drive, Clayton St. Louis, Mo.**

*(Continued on Next Page)*

# CLASSIFIED ADVERTISING — EQUIPMENT FOR SALE

*Announcing*

## Refinery Equipment, Inc.

**formerly**

***SONKEN-GALAMBA SUPPLY COMPANY***

**This change in name effective June 1st, 1943**

W. C. Berry
Union Ave. at 21st Street

Robert W. Duden
Tulsa, Oklahoma

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FOR SALE: Waukesha Engine, 100 HP, mounted on skids complete with reduction gear, clutch, gas-butane carburetor. Melton Machinery & Supply Co., Seminole, Okla.

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FOR SALE: Number 3-A National Drilling Machine. Complete with tools and Buffalo engine. For information, write: Murray D. Rowe, 350 Bay Street, Toronto, Canada.

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6", 7¼" Clark, 5½", 10" Cooper, 7" I-R to fit Cooper, 7¼ I-R, 6¾, 7⅛, 7⅜, 7½ Type 10 Bessemer, 12" Miller Reshopped Compressor Cylinders. 210-24 Southwestern Heat Exchanger. 8' x 40' Low Pressure Gas Testing Tower. 40" x 12' Reflux Tower. 9' x 4½' Graver Water Filter, 6' x 7' Graver Water Softeners. 6" x 5" Centrifugal Pumps, 1" Centrifugal Pump. 4 x 6 Fairbanks Morse Duplex Power Pump.
NOLAN SALES CORP. Tulsa, Okla.

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FOR SALE: Entire business of Second-hand drilling equipment, 8" Landis pipe machine, straightener, pipe stock, truck, trailer, float, fittings, buildings. WHITE-HEAD SUPPLY COMPANY, Box 94, Longview, Texas.

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FOR SALE: 300-13" OD, 8 thread, new casing couplings. 1—Gasoline Power Drilling Rig good for 3000'. Also Steam Drilling Rigs and pipe and casing of all sizes. We also purchase abandoned Leases, Refineries, pipe lines and other oil field equipment. If in need of material, or have material for sale, communicate with LOUISIANA IRON & SUPPLY CO., Shreveport, La., Phone 5223, or L.D. 1.

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FOR SALE: 8000' or any part, Used 3-Conductor Electric Cable good condition for any service 1000 Volt or less. Price 25c to 45c per ft. Free sample on request. General Tool & Supply Co., Box 4387, Oklahoma City, Okla.

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FOR SALE: 2000' 6⅝" OD and 2500' 5½" OD both 13# plain end, smooth, double random lengths, one weld per joint, clean inside and out, beveled, ready to lay. Price 40c. M. J. Regan, Coffeyville, Kansas.

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1500 BBL. Skimming Plant complete with pumps, lines, fittings, instruments, bolted storage tanks. To be dismantled and removed by buyer. SOVEREIGN REFINING COMPANY, 777 No. Washington, Saginaw, Michigan.

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TWO-STAGE Ingersoll-Rand Compressor with 30 HP Foos Balanced-crank Engine and Magneto, all for $750. E. Cline, 531 Third St., Marietta, Ohio.

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ONE 2½" to 8" Williams Pipe threading machine, complete with dies. 2—Delco light plants. P.O. Box 4441, Oklahoma City, Okla.

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Second hand Oklahoma City alloyed sucker rods, ¾", ⅞" and 1".
Have sold millions of feet with satisfactory results. I recommend these rods up to 4000 ft.

M. R. TRAVIS
1702 S. Boulder Tulsa, Oklahoma

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FOR SALE—One partial list steam rotary equipment and approx. 2000' of 6⅝" O.D. Drill Pipe located near Coyle, Oklahoma, priced right to sell. Inquire T. T. Eason and Company, Enid, Okla.

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FOR SALE: Complete slim hole rotary rig. Cardwell Drawworks, 7¼ x 12 Gardner Pump powered by 225 HP Waukesha Engine, 4200' of 3½" drill pipe, etc. Melton Machinery & Supply Co., Seminole, Okla.

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FOR SALE — One complete steam rotary outfit less boilers, located near Coyle, Oklahoma, priced to sell. Inquire T. T. Eason and Company, Enid, Okla.

---

FOR SALE: 1 size ½ ton water-cooled York refrigerating unit for drinking water system. Complete with tank, circulating pump, and six fountains. THE NATIONAL SUPPLY CO., Tulsa, Okla.

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12,000' of 3" Standard strictly #1 used plain end line pipe, lengths of 20' to 35'. A. A. GILBERT PIPE & SUPPLY CO., Shreveport, La.

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## DRESSER COUPLINGS

***For Sale***

***Immediate Shipment***

125—20" Dresser Couplings complete with Rubber Rings and Bolts, perfect condition.

50—30" Dresser Couplings complete with Rubber Rings and Bolts, perfect condition.

**BROWN-STRAUSS CORP.**
Box 78, Kansas City, Mo.

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FOR SALE: One 12" Merrill Geared Head Pipe Machine equipped with 6" to 12" Landis Head and one set chasers. $1250 J. A. Cree, Utica, Ohio.

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10 HP INTERNATIONAL, 25, 35, 40 HP Superior, 25 HP Bessemer, 30 HP Tico reshopped gas engines. Reid Power.
NOLAN SALES CORP. Tulsa, Okla.

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STEAM DRIVEN LIGHTING PLANT for Sale: G. E. Multiplar Generator, 110 Volts, 261 Amps. Direct connected Steam driven, Switch board and all complete and in A-1 condition. Sacrifice price f.o.b. Morgantown, W. Va. Address Maj. L. H. Jones, % B. M. Chaplin, 211 Race St., Morgantown, W. Va.

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FOR SALE: One 50 HP Sullivan Portable Compressor Class WO-102, Size 4¾ - 4¾ x 7, Double acting, Single Stage, 600 RPM. 172 cu. ft. displacement, approximately 100 CFM at 100 lbs. terminal pressure, 300 lbs. discharge pressure. Box B-612, The Oil and Gas Journal, Tulsa, Okla.

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COMPLETE Winkler & Koch designed pipe still with Vapor Separator. Also complete line Series 150 valves and fittings, bubble towers, bends and heavy tubing Omar Refining Company, Garber, Okla.

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FOR SALE: 300 Amp. U.S.L. Welder, mounted on Diamond-T truck. Box B-610, The Oil and Gas Journal, Tulsa, Okla.

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FOR SALE: 4¾" x 8" National Transit Vertical Triplex, Single Acting Plunger Pump, hot oil service. A-1 condition. VELSICOL CORPORATION, 120 East Pearson Street, Chicago, Illinois.

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1—6 x 16 Wilson-Snyder Power Slush Pump. 1—7¼ x 12 Gardner-Denver Power Slush Pump. 1—27½" Type H Emsco Oil Bath Rotary. 1—Wilson Giant Spudder Double Drum with Rotary attachment and JL 1335 Buda Engine. 1—Type R Cardwell Double Drum Spudder with HXD Hercules Diesel Engine. 1—Complete Oklahoma City Steam Rig with 3-125 HP 350# WP Acme Boilers. MAJOR TOOL & SUPPLY CO., Oklahoma City, Okla.

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## HORIZONTAL TANKS

3—14,250 Gal. Cap. 9' x 30'
2—11,250 Gal. Cap. 8' x 30'
1—10,500 Gal. Cap. 10' x 17'
2—18,000 Gal. Cap. 10' x 30'

Located Illinois and Michigan

**R. C. STANHOPE, Inc.**
60 E. 42nd St. New York, N. Y.

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**STILL, KNOCKOUT & ABSORBER**

1—5' x 18'6" x ¼" Welded Shell 5 Tray Knockout Tower, Tulsa Type.
1—3' x 27' x ⅜" Welded and riveted Shell 10 Tray Still, Tulsa Type.
2—5' x 30' x ⅛" Shell 15 Tray Southwestern Type, Absorbers.

**W. S. SMITH**
205 Thompson Bldg. Tulsa, Okla.
Phone 2-5473

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## 1200 BBL. CRACKING PLANT

**Heater 3" O.D. Tubes, hot oil pump flash tower, bubble tower 6' x 87' complete with 21 trays, gas oil stripper P.D. distillate receiver heat exchangers 250 lb. pressure floating heads, P.D. condenser, gas oil and fuel oil coolers, all new instruments complete, all pumps, complete treating plant and water system, all controls, pipes, valves and fittings. Cracking plant built and operated less than 30 days. Located St. Paul, Minnesota. Cash or terms.**

***SONKEN-GALAMBA SUPPLY COMPANY***

W. C. Berry
Union Ave. at 21st Street

Robert W. Duden
Tulsa, Oklahoma

# Classified Advertising

## EQUIPMENT FOR SALE

FOR SALE: Rotary Drilling Rig—Wilson Giant Drawworks, LeRoi 8 Cylinder Gas-Butane Engines, never run since rebuilt, choice 7¼" x 14" or 7¾" x 18" Lucey Pump, 122' Moore Derrick, outfit complete.
LUCEY PRODUCTS CORPORATION
Tulsa, Okla.

EQUIPMENT FOR SALE
Two 10 ft. diameter by 25 ft. long Pressure Towers, also one 6 ft. 6 in. diameter by 80 ft. long Pressure Vessel.
Power Construction Co.
216 Hodgson Bldg.
Minneapolis, Minnesota

**80,000 Bbl. Tank**

All steel, cut down, rivets backed out and match marked. Ready for loading. Located Sunburst, Montana. Guaranteed A-1 condition in every respect.

**Also 4—55,000 Bbl.**

5 ring all steel tanks located in Okla. A-1 condition.
SONKEN-GALAMBA SUPPLY CO.
Union Ave. at 21st St. Tulsa, Okla.

162—3½" OD—6½" Centers—Chrome Key Headers
30—Pieces 3½" ID—4" OD—21' to 28' Long—Chrome Tubes
120—Pieces 3" ID—3½" OD—30' Long—Chrome Tubes
1—⅛" Shell 5'x74'—4000 barrel cap. Crude Oil Fractionator with Trays
30—Pumps, various sizes and types

A. C. BARTSCH
BOX 127 FOREST PARK, ILL.

## EQUIPMENT WANTED

WANTED
Used Structural Steel
Pipe — Valves
Fittings
Send us your list.
SONKEN-GALAMBA CORP.
108 N. 2nd St., Kansas City, Kansas

WANTED: PUMPS, CLOSE CLEARANCE. CAST IRON LIQUID END SIMPLEX

| GPM | Suction | Discharge | Size |
|---|---|---|---|
| 8 | 300 | 500 | 6½ x 3 x 8 |
| 11 | 300 | 550 | 6½ x 3 x 8 |
| 14 | 80 | 550 | 14 x 3 x 14 |
| 12 | 250 | 360 | 6½ x 3 x 8 |
| 28 | 300 | 360 | 6 x 5 x 12 |
| 28 | 300 | 360 | 6 x 5 x 12 |

Box B-601, The Oil and Gas Journal, Tulsa, Okla.

WANTED: Bucyrus-Erie Drilling Machine, Type 24L - 24W 22W or 33W in good condition. Will pay cash. Write George Perry, Glencoe, New Mexico.

WANTED: Truck Load quantities of good used 5¼" O.D. (4⅞" I.D.) Casing, threaded and coupled. Also 5" I.D. Line pipe or casing. Advise price and location. CENTRAL PIPE & SUPPLY CO., P. O. Box 1442. Lubbock, Texas.

WANTED: Truck load quantities, or more, of used small pipe, black and galvanized, ½", ¾", 1", 1¼" and 1½", shopped or unshopped. Advise price and location CENTRAL PIPE & SUPPLY CO., 2611 Avenue H, Lubbock, Texas.

WANTED
Used storage tanks:
Pressure Tanks:
All sizes
Send us your list.
SONKEN-GALAMBA CORP.
108 N. 2nd St., Kansas City, Kansas

## EQUIPMENT WANTED

WANTED: VESSELS
1—24" x 32' x ½"-⅜" Shell
2—30" x 12'-15' x 15/16"-1" Shell
1—24" x 50' x ⅜"-½" Shell with Bubble Plates.

Box B-602, The Oil and Gas Journal, Tulsa, Okla.

WANTED TO BUY: Diesel Electric Plants from 15 KW to 60 KW AC 110-220. State full particulars. 1702 Transit Tower, San Antonio, Texas.

WE BUY refinery and oil field equipment, oil leases, pipe and valves. SOONER PIPE & IRON CO., Tulsa, Okla.

## INCORPORATION

DELAWARE CHARTERS: Powers broad, taxes low. Many of the largest corporations have Delaware charters. Complete service $35. Submitted forms. Chas. G. Guyer, Inc., Wilmington, Delaware.

## ROYALTIES

I OFFER production royalties in Osceola County, Michigan, low price, large monthly income. John Stouppas, 522 W. Broad Street, Columbus, Ohio.

ROYALTY and Leases, Ector, Refugio, McMullen and other counties. Map showing Ector royalty and Shell Seally wells. Free circular. Anderson, 1014 South Cumberland, Dallas, Texas.

## REAL ESTATE

PALATIAL SOUTHERN California residence for sale. Situated in wooded foothills near Pasadena within twenty-five minutes drive from Los Angeles. Two and a half acres, beautifully landscaped, protectively fenced, secluded. Elevation—2496. No fog. 40 x 30 living room. Wurlitzer pipe organ; steam heat throughout. Four elaborate bedrooms, four full baths, and two half baths. Attractive game and bar room. All gorgeously furnished by famous decorator. Ample servants quarters. Water purifying system, patios, tennis court, sun deck. Low taxes. Original cost 1932, $386,000.00. Owners, elderly, no family, will sacrifice for $140,000.00. Will consider trade oil royalties, oil producing or income properties. ELLIS I. HIRSCHFELD, attorney for owner, 629 S. Hill St., Los Angeles, California.

FOR SALE
The following real estate located in Rice County Kansas:
E½ SW¼ of Sec. 22-19S-9W
SW¼ of Sec. 27-19S-9W
N½ SW¼ of Sec. 34-19S-9W
N½ SE¼ of Sec. 34-19S-9W
This property is oil producing:
E½ SW¼ of Sec. 22—2 wells
SW¼ of Sec. 27—4 wells
N½ SW¼ of Sec. 34—1 well
One half of the royalty and mineral rights sold on this land. The remaining mineral rights and all agricultural rights subject to the rights of agricultural tenants are included. Possession will be given immediately upon delivery of deeds subject however to the rights of agricultural tenants. Sealed bids on any separate tract or all of said real estate will be received up until noon of June 15, 1943, and the right is reserved to accept or reject any and all bids. Any bids accepted will be subject to approval of the Court.
A. C. SAUBERLI,
Receiver, Sledd Farm Corporation
Lyons, Kansas

## California

*(Continued from Page 121)*

discovery well was only good for approximately 125 bbl. per day although it had several hundred feet of oil sand present. The lower part of the hole was plugged off, however, as it proved too tight to produce and contained some gray sand that appeared to carry water. This is pretty rugged country and it takes several weeks to build roads and excavate rig sites before work can get under way. This anticline is sometimes referred to as a jackknife, so abrupt and sharp are the flanks and plunge of the structure.

Ojai, Ventura County: S. D. Coates 5 Ojai, 7-4n-22w, abandoned in barren gray sand, T.D. 1,033 ft.

Fillmore wildcat district, Ventura County: J. J. Stevens 1 Fillmore, 31-4n-20w, abandoned in barren gray sand, T.D. 1,501 ft.

Newhall Potrero, Los Angeles County: Barnsdall 36 Rancho San Francisco, 35-4n-17w, flowed 625 bbl., 33.8°, 3 per cent cut, 1,250,000 cu. ft. gas, 32/64-in. bean, flow pressure 430 lb., T.D. 6,981 ft., perf. 6,518-33 ft., 6,658-98 ft., 6,743-63 ft., 6,808-6,938 ft., in second and third Modelo zones of Miocene age.

## Lago-Creole Merger Opposition Continues

NEW YORK—Proposed merger of Lago Petroleum Corp. and Creole Petroleum Corp., affiliates of Standard Oil Co. (New Jersey) continues under consideration after stockholders failed to reach an amicable decision last week. C. H. Lieb, president of the companies, said that considerable dissatisfaction has developed over the basis of negotiations.

## Crude-Oil Prices

Representative selected crude prices from all sections of the country appear below:

| | |
|---|---|
| East Texas | $1.25 |
| Conroe | 1.43 |
| Tepetate, Louisiana | 1.18 |
| Illinois basin | 1.37 |
| Pecos County, Texas | .95 |
| Bradford, Pennsylvania | 3.00 |
| Van, Van Zandt County, Texas* | 1.08 |

*No change since 5-21-41.

### Gravity Schedules

Top prices include all gravities above grades designated, and low prices include all gravities below grades designated:

| Gravity— | Signal Hill, Calif. | Oklahoma, Kansas | Gulf Coast Texas | West Texas* |
|---|---|---|---|---|
| 18-18.9 | $0.80 | .... | .... | .... |
| 19-19.9 | .84 | .... | $1.06 | $0.70 |
| 20-20.9 | .88 | $0.85 | 1.08 | .72 |
| 21-21.9 | .92 | .87 | 1.10 | .74 |
| 22-22.9 | .96 | .89 | 1.12 | .76 |
| 23-23.9 | 1.00 | .91 | 1.14 | .78 |
| 24-24.9 | 1.03 | .93 | 1.16 | .80 |
| 25-25.9 | 1.07 | .95 | 1.18 | .82 |
| 26-26.9 | 1.11 | .97 | 1.20 | .84 |
| 27-27.9 | 1.15 | .99 | 1.22 | .86 |
| 28-28.9 | 1.18 | 1.01 | 1.24 | .88 |
| 29-29.9 | 1.20 | 1.03 | 1.26 | .90 |
| 30-30.9 | 1.23 | 1.05 | 1.28 | .92 |
| 31-31.9 | .... | 1.07 | 1.30 | .94 |
| 32-32.9 | .... | 1.09 | 1.32 | .96 |
| 33-33.9 | .... | 1.11 | 1.34 | .98 |
| 34-34.9 | .... | 1.13 | 1.36 | 1.00 |
| 35-35.9 | .... | 1.15 | 1.38 | 1.02 |
| 36-36.9 | .... | 1.17 | 1.40 | 1.04 |
| 37-37.9 | .... | 1.19 | 1.42 | 1.06 |
| 38-38.9 | .... | 1.21 | 1.44 | 1.08 |
| 39-39.9 | .... | 1.23 | 1.46 | 1.10 |
| 40 and above | .... | 1.25 | 1.48 | 1.12 |

*Includes Lea County, New Mexico.

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# Journalisms:

COOPERATION between geologists and geophysicists has greatly increased the efficiency of exploration for oil but much remains to be done. Geologists have advocated more detailed study of sediments for years and a series of staff articles in The Journal beginning next week will discuss certain phases of the subject that have immediate practical application.

THE examination of reservoir rocks has a bearing on a science which is rapidly growing in importance, namely Reservoir Engineering. Physical and chemical characteristics of reservoirs are such that efficient methods of completion and recovery cannot be worked out completely without the aid of geology. Much progress has been made but conditions demand even more efficiency. Geologists can help, provided they receive executive support. Some of the procedures that may be followed will be covered in The Journal.

SOME weeks ago, there was published in the Exploration and Drilling Section a short article on increasing production by the application of heat. We do not know how many inquiries the author has received direct but if the number that have come through The Journal's office is any indication, he must have been swamped. The old adage about the better mouse trap and the beaten path still holds good, although it may be suggested that a good presentation in the proper place may convert the beaten path into a much-traveled highway.

OPERATIONS are perking up in Latin America, after protracted depression during earlier stages of the war. This week's Journal announces the negotiation of priorities for $50,000,000 worth of equipment for Mexico. Reports from Mexico City relate that an agreement has been reached between the United States and Mexico, covering erection in the latter country of a 100-octane gasoline refinery. Reported capacity is 5,000 bbl. daily. Presidents Roosevelt and Camacho, when they conferred recently, agreed on a four-man commission, two from each country, to study ways of cushioning the impact of war on Mexico. Subsequent issues of the Journal will tie these loosely related parts into a coherent mass, virtually certain that it portends highly significant developments over the next several months.

EASING of spacing requirements in eastern Oklahoma and Kansas and North Central Texas seems to be virtually assured. This will focus additional attention on these areas where there is much stripper production and in which are located the secondary-recovery projects to be discussed in early issues of The Journal.

# CALENDAR

**May**

JOINT PRODUCTION AND CHEMICAL COMMITTEE CONFERENCE, sponsored by Technical Section of American Gas Association, Hotel Pennsylvania, New York, May 24-25.

**June**

SOCIETY OF AUTOMOTIVE ENGINEERS, diesel engine and fuels and lubricants meeting, Carter Hotel, Cleveland, Ohio, June 2-3.

**September**

AMERICAN CHEMICAL SOCIETY, petroleum division, fall meeting, Septemper 6-10. Place of meeting not yet determined.